JADAM Organic
PEST and DISEASE CONTROL

POWERFUL DIY Solutions to 167
Common Garden Pests and Diseases

Written by **Youngsang Cho** | Photograph by **Deogkee Park**

JADAM

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POWERFUL **DIY** Solutions to 167 Common Garden Pests and Diseases

THE WAY TO INDEPENDENT FROM COMMERCIAL PESTICIDES

Written by **Youngsang Cho**
Photograph by **Deogkee Park**

www.jadam.us & en.jadam.kr

JADAM Organic
PEST and DISEASE CONTROL

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Photograph by Deogkee Park
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Edited and designed by Youngsang Cho & Sunhwa Ju
Cover designed by Design Rebound
E-book Edited by Sungwoo Cho
Office assistant: Sunyoung Cho

First Korean edition printed on March 15, 2021
First English edition printed on June 15, 2021

Published by JADAM Inc

Address: 311 Migun 2-B, 187 Techno 2-ro, Yuseong-gu, Daejeon, Republic of Korea, 34025
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Website: www.jadam.kr, en.jadam.kr & www.jadam.us
Publisher registration: May 29, 2000
Registration number: No. 20-1-41

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ISBN : 978-89-89220-47-3 03480

Printed in Korea (Kumkang Printing Co., Ltd)

Please help us to spread Ultra-Low-Cost JADAM organic farming methods all over the world. Please donate through **Paypal : vnt0226@naver.com**

JADAM developed several core natural pesticide technologies
manufacturing methods so that farmers can solve natural pesticides
themselves and all technologies disclosed without patents.

The use of self-manufacturing technology can dramatically reduce costs
while increasing the control effect. Furthermore, it can completely
replace chemical pesticides.

Farmers have been relying on agricultural input wasting
hundreds of thousands of dollars.
Now it is time to escape from the helpless high-cost agriculture dragged
by giant agricultural corporations.

Endorsement

Korea has been an agricultural power that began agriculture in the ancient Joseon Dynasty (B.C 2333-108). The trace is evidenced by numerous relics and food cultures such as hoe, plow, Byeokgolje, and calendar. However, in the modern age, agriculture has fallen to the level of a nuisance rather than 'Agriculture is the prop of the country,' and Korea degraded to the top importing country of agricultural products. Depending on the so-called economic experts' theory of comparative advantage, the ridiculous prescription that says, "It is advantageous to buy agricultural products by selling cars or mobile phones," is becoming a reality. It is very difficult to find agricultural hope under this basis. Is the path of hope for agriculture really impossible? While I have been working in the industrial and academic world for a long time, I could not find an agricultural prospect that could overcome the theory of comparative advantage.

We are in a time where a revolutionary alternative is in desperate need to escape from the last extremity of the food crisis. It is clear that organic farming is an alternative to be able to overcome global environmental pollution caused by chemical agriculture and that opens up sustainable future agriculture. The top technology of agriculture is organic farming. Organic farming, however, has not become popular due to technological limitations. Although the national scale of investment of budget and technology is made to expand the production of organic agricultural products, organic farming has not actually progressed with neither a vision nor a solution. However, in this situation, Mr. Youngsang Cho came up with a self-rescue book for organic farming. His book <JADAM Organic Farming> is the complete version of organic farming for humanity in the 21st century. This is a masterpiece that has accumulated over 60 years by the 30 years of author Youngsang Cho's achievement and another 30 years of his late father's task.

In addition, the book <JADAM Organic PEST and DISEASE CONTROL>, which was published this time, deserves to be mentioned as the finishing touch of organic farming. The classification and photographs of pests are so clear and alive that farmers can recognize at a glance. This book contains almost all of the solutions for those who are struggling with disease and pest control. It is a gift from nature that conveys the ecosystem of insects and pests in nature not only to farmers but also to the general public and even to agricultural research experts.

This book introduces the appropriate control methods that have been found through trial and error for many years to control diseases and pests so that anyone can easily follow them. It does not introduce any products necessary for control but is based on the technology of home-made substances invented by Mr. Youngsang Cho. It also shows the world of insects from eggs to imago in amazingly vivid photographs, which must be an artistic masterpiece. These two books, written by Mr. Youngsang Cho, present soil management, microorganism cultivation, fertilization design, and solutions for replant failure that are necessary for organic farming, and introduce the invention and directions of organic pesticides for pest control. These books will position themselves as key agricultural technical books around the world.

I dare to say that the book <JADAM Organic PEST and DISEASE CONTROL> will be the best gift for mankind in the 21st century. And the value of this book is worth beyond the national agricultural budget for years. This is a masterpiece that is difficult to complete within a few years even if large-scale agricultural research institutes pour effort. This book contains technological innovation that is enough to lead organic farming and stop chemical one and is sufficient to make a significant contribution to restoring nature around the world. I hope that the government organizations related to agriculture will recognize the value of this book as soon as possible and use it as an essential book for agricultural development. I am concerned that there will be many difficulties in the process of establishing this book as a solution for not only Korean agriculture but also for global agriculture. By all means, I sincerely hope that the globalization of JADAM organic farming will cruise and become the centerpiece of agricultural hope.

I am the one who has researched the natural pesticide developed by Mr. Cho for more than 10 years at a national research institute in order to scientifically prove it, and I, therefore, can distinctly appreciate its value. Mr. Cho's <JADAM Organic PEST and DISEASE CONTROL>

is a masterwork that will solve the problems of Korean agriculture and, by extension, global agriculture. If farmers accept JADAM technology and use homemade eco-friendly pesticides, the cost reduction effect is truly enormous. Imagine farmers around the world cheering, freed from the shackles of a chemical pesticide company! Imagine the unfolding of an exciting world of agriculture where you can draw the future through farming, and the costs that are saved by the reduction of pesticide will return to farmers' portion!

I can assure you that the results of Mr. Cho's research have marked a milestone in the history of agricultural technology in humankind. This is an 'independent agricultural technology book' that will solve the agricultural problem against the agricultural technology that is monopolized by the giant multinational corporations shaking the world. Pollution of the world is at its peak with increasing chemical fertilizers and chemical pesticides every year. This book suffices as an innovative technology alternative to stop that trend. I highly recommend this book as an 'Agriculture Secret' that will lead the future agriculture and saving farmers, agriculture, and nature together.

March 15, 2021

Dr. Chunwoo Nam
National Institute of Horticultural & Herbal Science (NIHHS) in Korea

Greetings from the author

As preparing this book for a long time and finishing its editing, I feel that the accumulation of time is exerting amazing power. The birth of this book was possible thanks to the 60 years of research on organic farming that followed the accumulated experience of my father, who had been engaged in the natural farming movement in Korea all his life. I couldn't even imagine that an individual would publish a book with a solution covering all diseases and pests in agriculture, but finally, it came true. Also, it was possible thanks to the enthusiasm, practices, and information sharing of eco-friendly farmers who have been with JADAM. This book is not a list of vague pest control information. It is not a book that introduces pesticides in the way that certain pesticides are good for certain pests. This book speaks of a new pesticide that is completely departed from the way of relying on purchases from pesticide companies. This book is talking about environmentally friendly pesticides that are powerful enough to entirely replace chemical pesticides. Forget about the insignificant effects of eco-friendly pesticides you've experienced before.

This book introduces the easy way of making basic substances of eco-friendly pesticides that are using raw materials by the farmers themselves and suggests the proper mixing ratio of substances for each disease and pest. Apply the solution of this book to the field right away. If you compare the solutions with the effects of existing chemical or eco-friendly pesticide products, you will immediately confirm that JADAM Natural Pesticide (JNP) are out of the ordinary. You will find the practical possibility of Ultra-Low-Cost organic farming that can reduce the cost of pesticides by more than 95%. I shout to farmers around the world through this book. Free yourself from the subordination of agricultural chemicals and agricultural materials companies that you have had to be bound for a lifetime. All farmers who are left destitute and desperate, losing the initiative of technology by commercial enterprises and falling into a level of a mere consumer, take the initiative again. I declare that JADAM raised the flag for the liberation of agricultural technology.

COVID-19 is making us fully realize how important it is to provide our own food. An era is coming when small farming for self-sufficiency is essential even for urban residents. This book will also be of satisfactory help to those who do urban farming. This book is not perfect yet. So, I will receive your opinions and supplement and fill this book to be perfect. I would like to offer my deep gratitude to the outstanding photographer Mr. Deogkee Park. This book shines more thanks to the lively photos that present the ecology of insects. I would like to express my gratitude to Donggeun Choi, Jongseo Park, Kyunghee Lee, Wonkyung Lee, Sanghee Lee, Steven Cornett, who gave close advice and took charge of correction until this book was completed, and Sunhwa Ju, Sunyoung Cho, Yea Cho, and Sungwoo Cho, who have been carrying on three-generation organic farming with me as my family.

March 15, 2021

Youngsang Cho
President of JADAM

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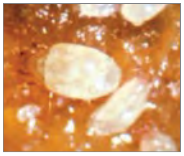
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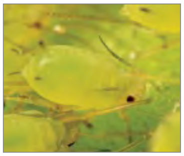
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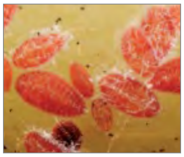
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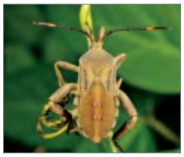
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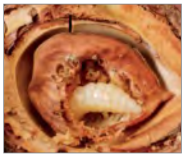
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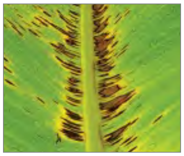
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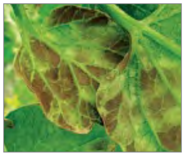

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Description table of JADAM Natural Control Ratio

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	50ml
JWA	200ml	300ml	500ml
JHS	200ml	300ml	500ml
JMS	800ml		
NaOH			40g
Fine soil			60g
Control interval	7days	Visible effect	30 minutes

- Standard (20 L): The total voulme of water and materials mixed
- Prevention: Pest and disease control performed before the occurrence of pests and diseases
- Occurrence: Pest and disease control performed during the occurrence of pests and diseases
- Emergency: Pest and disease control performed during the occurrence of numerous pests and diseases
- Control interval: A gap recommended for spraying pesticide for pest and disease control
- Visible effect: A time for visually confirming the results of pest and disease control
- NaOH (**Sodium hydroxide**): NaOH is added to 50ml of water and shaken well before use.
- Fine soil: Fine soil powder is diluted with water to obtain one-tenth of the original concentration, shaken, and used after precipitation for a minute. Rock powder or mud can replace Fine soil.

JADAM Natural Control Ratio

Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	30minutes

- Winter Control: It refers to pest and disease control performed from when a harvest is completed to the time a bud sprouts. I recommend performing pest and disease control at two different time points: Once seven days before buds or flowers bloom, once just before buds or flowers bloom. Pest and disease control should be performed for perennial fruit trees in winter(after harvest)
- Occurrence Time: If occurrence of harmful insects is not visually confirmed, spray pesticide when their occurrence is expected.
- Suitable time for Spraying Pesticides: Insecticidal effects are the greatest when pesticide is sprayed in early dawn, which is characterized by high humidity levels. However, pesticide can also be sprayed when harmful insects are expected to move actively.
- The Order for Mixing Pesticide: Add 15 L of soft water. Then, add the materials for pesticide in the order and stir. Add more soft water to obtain a total volume of 20 L.

Sources of information on the lifecycle of pests and diseases:

Sources are stated below the corresponding text

- The Korea Rural Development Administration (RDA): The National Crop Pest Management System (NCPMS)
- The Korea National Arboretum: The Korea Biodiversity Information System
- The Korea Forest Service (KFS): The National Institute of Forest Science
- Guide for the use of of natural enemies (Yongheon Kim et al.)
- Doosan Encyclopedia
- Wikipedia

Source of photos source: Photos source are stated at the right bottom of the corresponding photos. Photos without photos source are taken by Deogkee Park.

Until The Completion of This Book

Planning to write a book with information on pest and disease control that can surpass the existing globally published books

I have written this book through extensive preparation for 6 years since 2015. I bought and read the existing books regarding pest and disease control published globally and realized that these books did not include sufficient content on pest control. After reading these books, I was sure that I can publish a valuable book for the farmers worldwide by including visually detailed photos of pest and disease and considering that JADAM Natural Pesticide (JNP) can effectively control most of the insects and germs.

I requested Deogkee Park, an outstanding insect photographer, to take photos of the most harmful and commonly found insects for this book. As a result, this book was able to contain outstanding photographs. There is still a long way to go for completing the contents of this book. My efforts will be constantly put to enrich the contents of this book and make it highly valuable.

Knowledge accumulated over 30 years and efforts made for 20 years

My father, Hankyu-Cho, established Korean Natural Farming (KNF), began performing farming-related activities since 1967. At the age of 87, he still provides instructions to farmers in the field. So far, KNF has been loved by farmers worldwide. My father and I have recently been on joint speech tours in the United States and the Philippines. We received fervent response from farmers in these countries.

In 1989, after I was discharged from the military service, I began learning methods for crop cultivation and livestock breeding from my father. When I first started organic farming, organic farming methods were very lacking in pest control methods. I realized that research on pest control methods is desperately needed to generalize organic farming.

Although methods based on vinegar, alcohol, and sugar were used around that time, they tended to show poor pest and disease control performance. In addition, pest and disease control methods introduced in Japanese books did not show substantial difference from these methods.

I launched an official website of JADAM (www.jadam.kr) in 2003 and have been managing an open Q&A bulletin board for the public since then. In addition, farmers can easily contact me via phone. Hence, it can be said that I have direct knowledge of the concerns of farmers regarding pest and disease control and felt the need for a book to introduce new and effective pest and disease control methods. I have obtained abundant information on pests and diseases in the field and have put continuous efforts for a long time to find a solution for pest and disease control. The effort has been successful, and there are currently over 75,000 members supporting JADAM's method in Korea. It also has over 2,000 regular supporters who financially support JADAM each month.

JADAM Ultra-Low-Cost (ULC) Organic Farming methods and relevant policies

In pursuit of strategies for ULC organic farming, JADAM has made endless efforts to enable farmers to take the initiative of using farming technology without depending on the agricultural companies. I believe small-scale farmers around the world are struggling with a lack of agricultural technology initiatives. So, farmers have no choice but to continue high-cost agriculture that was dependent on enterprises. I have dedicated to developing ULC agriculture to solve these structural problems.

In particular, pesticides place a heavy economic burden on farmers. Pesticides approved for organic farming are expensive despite their weak effect, which further increases the burden on the farmers. I developed several core technologies for pesticide manufacturing to help farmers produce pesticides by themselves. Moreover, I have revealed these technologies to the public instead of patents.

JADAM farming technologies can increase pest and disease control performance and significantly reduce relevant cost. ULC Farming would not have been possible without the JADAM development of pesticide manufacturing technology. The farming technologies that I have developed is accessible to the public through the JADAM YouTube channel. Several videos on core technologies for JADAM ULC organic farming are freely provided on this channel, and they are also dubbed in English. When viewers use a subtitle function provided on YouTube, they can watch these videos in approximately 40 languages. These language options will help farmers all over the world learn ULC agriculture without having to buy a JADAM book.

We will continue to work hard to make ULC farming easier to learn, even if there are difficulties in geographical access and economic difficulties by adding dubbing in multiple languages.

JADAM Organic Farm

Performance of JADAM technologies confirmed through the cultivation of 60 types of crops

I invented a core pest and disease control technology for organic farming. JADAM Sulfur (JS) is a multi-purpose fungicide and JADAM Wetting Agent (JWA) use for wetting and insecticide. I also discovered a method of using ginkgo berries both as an insecticide and repellent to most insects. Another product that I invented is a JADAM Microorganism solution (JMS) by boiled potatoes; it showed excellent performance in enhancing soil conditions and controlling pathogenic bacteria. These techniques can be easily used by everyone.

To enhance the quality of this book, I did a more thorough preparation that involved cultivating 60 types of crops and fruit trees in JADAM farm for the past 5 years and conducting tests on them by applying natural pesticides. I did my best to verify the effects of JADAM Natural Pesticide (JNP) on most plants that farmers cultivate globally. Based on the test results, I have concluded that JNP shows outstanding performance for the entire plants. Moreover, owing to its effectiveness, JNP can completely replace existing chemical pesticides.

Pest and disease control experiments conducted in tropical areas of Hawaii for a year

South Korea, where the foundation of most stories introduced in this book has been laid, is located between latitudes of 33° and 39° north. Although it used to be characterized by clearly distinguished four seasons, its climate has rapidly changed to subtropical because of global warming. This change brought limitations to applying natural pesticides for experiments in South Korea. Fortunately, I made a contract with the Government of Hawaii to develop a method for controlling coffee berry borers. This contract allowed me to visit Hawaii and carry out various experiments there for a year in 2016. Hawaii is well-known for its diverse climate zones.

I successfully developed a method for controlling coffee berry borers (CBB), which cause critical damage to approximately 20 million coffee growers worldwide. Such success also provided me with more opportunities to expand pest and disease experiments in the American state. JNP clearly showed significant pest and disease control effects on various pests and diseases observed in plants in that region.

My book “JADAM Organic Farming” has been translated in about 20 languages. This book is well received by people all over the world. The JADAM technologies developed in South Korea have become valuable for people worldwide.

Coffee berry borers(CBB)

Scientific verification through joint research with National Agricultural Research Institute

Effects of pesticides can be easily verified. Anyone can examine such effects within a few minutes or days after spraying a pesticide. However, it is difficult to officially verify technological effects of pesticides only based on cases of application in agricultural fields. In other words, scientific verification results should be obtained through academic research that can be approved by the agricultural circle.

Dr, Chunwoo Nam, an expert working in the National Institute of Horticultural and Herbal Science (NIHHS) showed a special interest in JADAM technologies and has conducted relevant research for over 10 years. His research results verified the outstanding effects of JNP on peppers and tomatoes, which cannot be easily grown using organic cultivation. Excellent outcomes were also derived in terms of quality and yield. Several research papers reflecting the aforementioned results were officially registered and published.

I am currently completing my doctoral degree in phytopathology at the graduate school of Jeonbuk National University. I aim to make consistent efforts to establish JADAM technologies-both practically and academically. Performance of JADAM Natural Pesticide(JNP) is not questioned anymore as it has been verified empirically and academically. This book will allow readers to find solutions for ULC organic farming that can be instantly applied.

Why do we need pesticides?

Can plants protect their fruits by themselves?

I have met many people who believe that healthy plants can protect themselves and their fruits against pests and diseases. Most of them also consider the use of pesticides as an inferior technology. Their ultimate goal for organic farming is ideal agriculture that facilitates coexisting and symbiotic without the use of pesticides. A few prominent ecologists have provided plausible logical explanation, which has fortified the aforementioned set of values.

What do trees obtain from protecting fruits safely until the moment of harvesting? The ripe fruits will fall from trees and begin rotting with an unpleasant odor. When spring comes, seeds in the fruits will sprout and bud, similar to growing bean sprouts. Through this process, what do trees obtain?

Ginkgo trees faced a crisis of extinction under similar context. Ginkgo berries were ignored by insects and animals because of their unpleasant odor, and all the berries fell from the Ginkgo trees. This phenomenon is an alarming signal indicative of the failure in species reproduction and a close approach to extinction. If trees bear fruits that cannot attract insects and animals, such tree species will not be found in the future.

Only those plant species that have successfully managed to attract insects and animals have survived to date. In other words, the entire plant species have evolved instinctively in the opposite way to that of Ginkgo berries to save themselves from becoming extinct. Such natural phenomenon can be elegantly expressed as checks and balances. However, the harsh reality is that the alienated species will extinct from dog eat dog world in real nature.

Agricultural technology reflecting accomplished monopoly

Trees make their fruits more colorful, delicious, and aromatic around the harvesting season to attract more insects and animal. Such activities can be viewed as their efforts toward protecting themselves from becoming extinct. For this reason, farmers have no choice but to rely on pesticides, as they cannot produce commercially viable fruits without pesticides. In order for organic farming to be successful as commercial agriculture, pest control techniques are essential. I do not mean that it is inappropriate to plant and grow various types of plants without the use of pesticides. What I am trying to say is that farming without pesticide is impossible as long as farming is performed to gain economic profits.

Although agriculture relies on nature, it also represents an accomplished monopoly involving the rejection of sharing fruits with nature. Success of such monopoly has led to achievement of capital and agricultural prosperity. Chemical pesticide, which is used as weapon for maintaining this monopoly, has sickened the entire Earth and triggered serious problems for human beings. Commercial organic farming implies the selection of a new method for reducing damage to nature. In my opinion, however, it is still confined to limitations of the accomplished monopoly.

New species without resistance experience on pest and disease

The plant species that we consume in daily life is not from the wilderness. Most of the consumable plants were improved by human to suit the appetite of human beings. The seed production process involves thorough pest control. Most organic seeds are no exception either. Seeds that have never resisted directly against pests and diseases come into our hands. While cultivating such first-generation seeds, it is useless to expect to withstand and endure pests and disease on its own.

Most large pesticide companies in the world possess their own seed companies. Such possession leads to misfortune for us, given that these companies would not produce seeds that do not require the use of pesticides. Instead, they would be more inclined to produce seeds that require frequent use of pesticides and ultimately increase the sales of pesticides. We must be aware that we are in these limitations. Some will choose to farm with native seeds to escape from the system, but it is challenging to secure product value and marketability. Because our taste is also changed, most of us no longer familiar with the taste of the native plant.

Exhaustive preparation required even for small-scale organic farming

Interested individual or group of people buys the various type of seedlings and start planting with an excitement. People often imagine that these seedlings will grow well just with water, just like how they've seen on a short TV program. However, these expectations will begin to collapse in front of reality. It is not very difficult to organically cultivate lettuce varieties with fewer pests and diseases. However, if a person grow cucumbers, tomatoes, and chili peppers, which are prone to pests and diseases, soon that person realizes that farming on a small scale is not easy. Regardless of the scale, farming becomes unsuccessful without the application of professional technology for pest and disease control.

When mites and aphids appear, they spread quickly. Powdery mildew and anthracnose ruin the shape of plants and make it difficult for people to collect a proper amount of yield. People lose motivation and confidence through repeated experience in these events and eventually giving up on farming.

Thorough preparation is required when you plan to produce agricultural products for self consumption, regardless of whether you perform farming as a hobby or at a small scale. I often say that farming should be carried out with a sense of war tension. Farming becomes unsuccessful when we rely only on nature. We cannot stop feeling anxious regarding farming until we die if we are not certain about pest and disease control. However, to put it another way, we can feel peaceful when we become confident about the pest and disease control measures.

If you can control only aphids and powdery mildew, you can control all pests and diseases.

If you can control only aphids and powdery mildew, you can control all pests and diseases. This book describes 137 species of harmful insects and 30 types of diseases that are commonly observed in farming and presents solutions for controlling them. You might feel scared about learning the entire 167 solutions suggested in this book. However, you do not need to worry at all. As long as you can control aphid infestations and powdery mildew, the control method described can be applied to other types of germs and insects as well. The 167 solutions presented in this book can be understood easily. Successful cultivation of just peppers and cabbages can also lead to successful cultivation of the other plants . If you can effectively control aphids and powdery mildew with JNP, and you can grow chili peppers and cabbage well with JNP, you are a professional organic farmer. If you only control aphids and powdery mildew, you can control all pests well. JNP has a powerful control effect on these two.

Reducing pesticide cost by 95% using JADAM Natural Pesticide (JNP)

You can instantly use JADAM Sulfur (JS) and JADAM Wetting Agent (JWA) by learning the techniques to produce them and following a few rules for pesticide application. A significant advantage of using these techniques is the reduction in the cost of pesticide by 95%. You will also be satisfied with the pest and disease control effects. Those who have used chemical pesticides will also be amazed by the performance of JNP. I have verified that JNP can perfectly replace the existing chemical pesticides. You can easily confirm this possibility. Through the use of JNP, you can enjoy satisfactory farming without high-cost farming. Since most commercially available chemical pesticides frequently develop pesticides , there is a difficulty in constantly finding new pesticides. However, JNP is surprisingly free from pesticide resistance.

Damage by aphids and powdery mildew are frequently encountered problems in farming. JADAM Natural Pesticide(JNP) can control these insects and diseases perfectly.

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	50ml
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	Visible effect	30 minutes

A comprehensive pesticide for disinfection and insecticideS(JS+JWA+JHS)

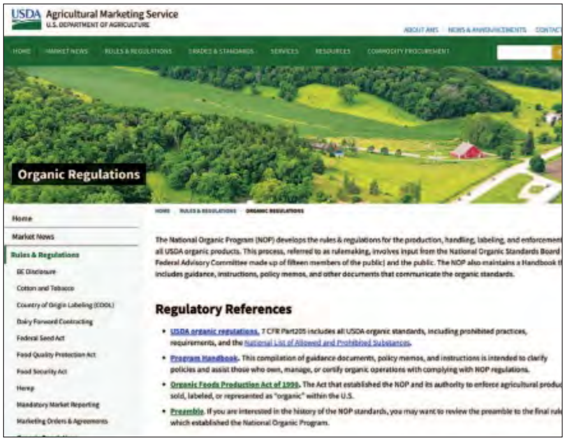
A comprehensive pesticide for disinfection and insecticide can be produced by mixing JS with JADAM Herbal Solution (JHS). Ginkgo berries use to produce this multi-purpose insecticide, it has a strong control effect on almost all pests. You can use it according to the ratio given in the table above. JADAM pesticide has an advantage in that insects do not develop tolerance to it. So there is no problem with continuous use of this simple combination(JS+JWA+JHS) of pesticides throughout the year. JNP is very simple and anyone can follow it easily.

Pesticide research that can be performed easily

Pesticide research is not a field just for experts

It is generally believed that pesticide research can be performed only by experts who majored in chemistry, agriculture, and plant pathology. It requires a highly advanced academic background and a great amount of financial resources. Indeed, large pesticide companies possess many financial resources and perform a considerable extent of research. For this reason, most farmers do not even think about conducting pesticide research by themselves. I want to break this fixed idea. If you stop using commercial pesticides and follow JADAM's self-manufactured pesticides, you can save hundreds of thousands of dollars and avoid going bankrupt.

Therefore, I strongly recommend farmers to directly initiate pesticide research. It is crucial for farmers to take this initiative as it is closely related to the success of their agriculture. Pesticide research is simple because you just need to make the necessary substances for the pesticide, mix them, and apply the mixture to various types of pests and diseases. If satisfactory results are derived, the mixture that you have developed can be used as a complete pesticide. I have revealed the complete methods for producing essential core substances for natural pesticides. Thus, you can just apply these solutions to pests and diseases, without the need for developing pesticide substances.


USDA Agricultural Marketing Service
U.S. DEPARTMENT OF AGRICULTURE
ABOUT AMS
NEWS & ANNOUNCEMENTS
CONTACT
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RULES & REGULATIONS
GRADES & STANDARDS
SERVICES
RESOURCES
COMMODITY PROCUREMENT
Organic Regulations
HOME
RULES & REGULATIONS
ORGANIC REGULATIONS
Home
Market News
Rules & Regulations
BE Disclosure
Cotton and Tobacco
Country of Origin Labeling (COOL)
Dairy Forward Contracting
Federal Seed Act
Food Quality Protection Act
Food Security Act
Hemp
Mandatory Market Reporting
Marketing Orders & Agreements

The National Organic Program (NOP) develops the rules & regulations for the production, handling, labeling, and enforcemen all USDA organic products. This process, referred to as rulemaking, involves input from the National Organic Standards Board Federal Advisory Committee made up of fifteen members of the public) and the public. The NOP also maintains a Handbook t includes guidance, instructions, policy memos, and other documents that communicate the organic standards.

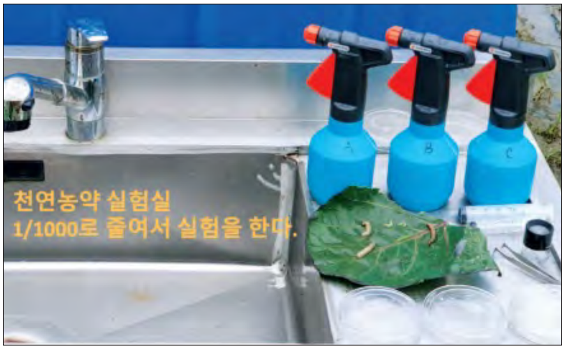
Regulatory References

- USDA organic regulations. 7 CFR Part205 includes all USDA organic standards, including prohibited practices, requirements, and the National List of Allowed and Prohibited Substances.
- Program Handbook. This compilation of guidance documents, policy memos, and instructions is intended to clarify policies and assist those who own, manage, or certify organic operations with complying with NOP regulations.
- Organic Foods Production Act of 1990. The Act that established the NOP and its authority to enforce agricultural produ sold, labeled, or represented as "organic" within the U.S.
- Preamble. If you are interested in the history of the NOP standards, you may want to review the preamble to the final rul which established the National Organic Program.

The above image is a sanpshot of the official website of the United States Department of Agriculture (USDA). This website presents regulations on organic farming in the U.S., and these serve as the international standards for determining substances allowed for organic farming.
https://www.ams.usda.gov/rules-regulations/organic

Safety of JADAM Natural Pesticide (JNP) is internationally ensured

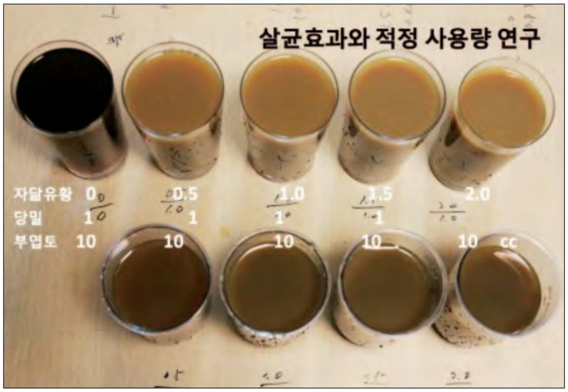
Pesticides are likely to cause damage to people because they are used to control pests and diseases. Thus, it is essential to fulfilling the safety criteria in the process of producing pesticides. International standards for substances that can be used for pest and disease control in organic farming have already been established strictly based on safety. According to these standards, only those substances verified to cause little damage to people are approved. In addition, only those food additives that are allowed for processing agricultural products obtained through organic cultivation are approved. Here, sulfur (S, EPA-List 4A), sodium hydroxide (NaOH, EPA-List 4B), and potassium hydroxide (KOH, EPA-List 4B) are also included. Therefore, agricultural products cultivated using JNP have obtained organic certifications in both South Korea and other countries. After spraying JNP, you can wash it and eat it right away.

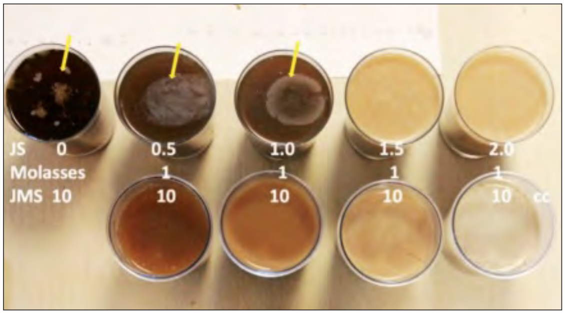


A lab for testing natural pesticide: Experiments are carried out based on a reduced ratio by 1/1,000

A pesticide lab can be prepared with 3 spray containers of 500ml, a syringe of 20ml, a syringe of 5ml, a pair of tweezers, a magnifier, and 5 Petri dishes.

An optimal proportion is sought by adjusting the ratios of JADAM Sulfur (JS), JADAM Wetting Agent (JWA), JADAM Herbal Solution (JHS), sodium hydroxide, and fine soil and by confirming the effects of the mixture for disinsectization and disinfection.





Research on disinfection effects and appropriate mixture ratios

A small quantity of molasses is added to water, followed by a small amount of leaf mold soil(microorganisms). Different concentrations of JS are added to cups, and the responses are examined. When JS shows disinfection effects, the color and surface form of the mixture does not change. Based on this simple method, an appropriate mixture ratio, which enables JS to effectively control microorganisms or pathogens, can be easily found.

A pesticide lab can be prepared with only $100

One can easily conduct insecticide research as long as you have a sprayer and a syringe. All you need to do is to spray the prepared mixture on the pest. If the mixture is effective, larvae will twist their bodies, suffer from pain, and die. If it is ineffective, pest will live as usual. You can search for an appropriate mixture ratio by checking out the results from similar research conducted previously. Approximately, only 10 min is required to confirm the effects of the mixture. As shown in the photo on the right side, you can even perform fungicide research, which is generally considered difficult, using several glass cups.

Pesticide research is not complex. Anyone can perform it at the same level as that of experts as long as there is willingness to participate in it. I have not become a pesticide expert because I have a set of particular abilities. Pesticide research is quite simple. There is no need for farmers to be afraid of such convenient pesticide research, considering that they have been dependent on pesticides in their entire farming lives.

Be a self-sustainable farmer and declare independence from the current system

JADAM has already disclosed the manufacturing technology and the appropriate ratio. Just follow this. If you feel short of information, you can find a better way for yourself and share information between farmers to create a more perfect technique.

I think it makes human beings miserable to continue a life of dependence health dependence on medical services, and agriculture dependence on agricultural input and agricultural chemicals until death. This capitalist civilization is making us completely helpless and consumers of everything. This result leads the public to financial bankruptcy and very few stacking wealth. The expansion of this phenomenon is eating up national finances and putting civilization into an extremely unstable crisis.

As I get older, I think that expanding the areas that you can do on your own will make you more financially stable and create a mentally happy life. I hope that choosing JADAM will go beyond changing agriculture and be a start to change the whole of your life. Health that can be solved by oneself, agriculture that can be solved by oneself, few of these simple thing is the blessing of life. Step on the path of a self-reliant life that doesn't need to depend on even relying on JADAM for growing your agriculture!

Independent from commercial pesticides

JADAM Natural Pesticide (JNP) can completely replace chemical pesticides. This mention is not a bluff, and it is the conclusion we have obtained by applying it to various crops for over a decade. On page 506, you will find information on where to purchase the raw materials needed to make JNP. Be sure to buy raw materials and make your own JNP. And spray it on common aphids and powdery mildew. You will be able to see the true value of JNP right away. Two papers scientifically proving the effects of JNP are also attached after page 497 at the back of this book.

Farming is not always peaceful. It is necessary to prepare thoroughly for vigilance and response to pests that may occur from time to time. Only by taking these tensions for granted you can enjoy the joy of farming.

Ask JADAM any questions

If you have any questions about organic farming, ask them through 'Sharing JADAM' on the JADAM site. We will do our best to answer for your agricultural development. (en.jadam.kr)

JADAM Organic Farming
Ultra-Low-Cost
Change the future of farming!

How to make powerful natural organic fungicide the JADAM Sulfur. (how to melt sulfur without fire)

How to make powerful natural agriculture surfactant (JADAM Wetting Agent)

Introduction of JADAM Organic Farming

The Order for Mixing JADAM Pesticide

Add 15 L of soft water. Then, add the materials for pesticide in the order and stir. Add more soft water to obtain a total volume of 20 L. Agglomeration occurs when JS, JWA, and JS are mixed with each other.

Composition and conditions of JADAM Natural Pesticide

Configuration of JADAM Natural Pesticides (JNP) is simple.

The composition of JNP is JADAM Sulfur (JS), JADAM Herbal Solution (JHS), JADAM Wetting Agent (JWA), JADAM Microbial Solution (JMS), Sodium Hydroxide (NaOH), and Fine soil. Depending on how this is combined, it can be either an insecticide, a fungicide, or a pesticide with both insecticidal and germicidal effects. The core technique is to simply add or reduce the amount of a certain substance. Most pests cannot develop tolerance to JNP. In addition, JNP is a nutrient for crops, increasing the sugar content of the product, increasing its quality and increasing its shelf life.

Condition 1. Soft water

Soft water should be used to produce JWA and JHS. In addition, water for pesticides should also be soft water. Soft water facilitates the wetting effects of JWA. Wetting ability of pesticides are crucial because it increases pest and disease control effects and prevents traces of pesticides and concentration damage. JWA is applied to implement such properties. Soft water does not contain a great amount of positive ions, such as iron, calcium, and magnesium. It is generally gentle on the human skin, and people find it sweet when they drink it. Rainwater is a representative example of soft water. Soft water is also frequently found in groundwater, reservoirs, and streams. In addition, soft water includes water from refrigerators and dehumidifiers, distilled water, and distilled water sold in supermarkets.

Condition 2. The most humid time of the day

JADAM pesticide is insignificantly toxic because it is composed of substances (EPA-List 4A, 4B) that are graded to be almost harmless to the human body. JNP. should be sprayed in an environment where it cannot evaporate quickly. The pest and disease control effects increase with the time provided for the sprayed JNP to dry. For this reason, it is the most effective to spray JNP during early dawn. The pest and disease control time can also be adjusted according to the active period of harmful insects.

Condition 3. Careful mixing

It is recommended to avoid mixing with other substances while JADAM pesticides spraying. Particularly, it must not be mixed with substances containing vinegar, wood vinegar, sugar, and molasses because these substances can trigger traces of pesticides and decrease the wetting ability of JNP. JWA and JS can be mixed with chemical pesticides. However, for such mixtures, a test for concentration damage should be carried out in advance. JMS and JS should not be mixed together.

Functions of JADAM Wetting Agent (JWA)

JWA increases the wetting ability of JNP. So, if JWA is removed from the mixture of pesticides, the control effect will disappear. As the amount of added JWA increases, the germicidal and insecticidal effects also increase. A about 30-fold dilution of JWA alone has a strong insecticidal effect on its own. Aphid infestations and powdery mildew are controlled using a 100-

fold diluted solution, whereas anthracnose and moths are controlled using a 40-fold diluted solution. JHS is also a good nutrient for crops.

Functions of JADAM Sulfur (JS)

JS can control almost all diseases, including anthracnose. I think there is probably no other disinfectant as powerful as JS. A 250-1000 fold diluted solution of JS exhibits disinfection effects; additionally, a about 150-fold diluted solution demonstrates disinfection and insecticidal effects. However, a 1,000-fold diluted solution is used for grapes, cherries, persimmons, and plants grown in greenhouses due to a possibility of concentration damage. Accordingly, a test for concentration damage should be conducted when JS is used for the first time. JS is also a good nutrient for crops. JS is good for improving the color of the fruit and increasing the sugar content.

Functions of JADAM Herbal Solution (JHS)

Most herbs, such as rosemary and mint, show insecticidal effects on small-sized aphids and mites. Pokeweed, artichoke, bracken, oleander, ginkgo leaves, and ginkgo berries are also used to kill moths. Ginkgo berries have insecticidal and repellent effects on almost all pests and can effectively control mosquitoes, stinkbugs, foreign pests, and moles. Sodium hydroxide (NaOH, 20 to 60 g based on 20 L) can be used instead of JHS. However, constant use of this chemical can result in damage to plants or reduced quality of fruits. Intermittent use is recommended in the absence of JHS. Ginkgo berries have a powerful control effect that can be called an all-purpose pesticide. If you have a few fruiting ginkgo trees on your farm, organic farming will become a reality very easily. JHS is also a good nutrient for crops.

Functions of JADAM Microorganism Solution (JMS)

The existence of various microorganisms on the surface of soil and plants can also prevent certain pathogenic bacteria. The simple method of irrigating the soil with JMS and spraying it on the plants is excellent in preventing disease. This method makes the soil very soft and promotes the root growth of the crops. JMS is more effective in preventing specific pathogens by increasing microbial diversity rather than finding individual solutions to countless diseases. If disease occurs despite the use of JMS, you use the powerful disinfectants JS. JS can easily control even the most difficult anthracnose.

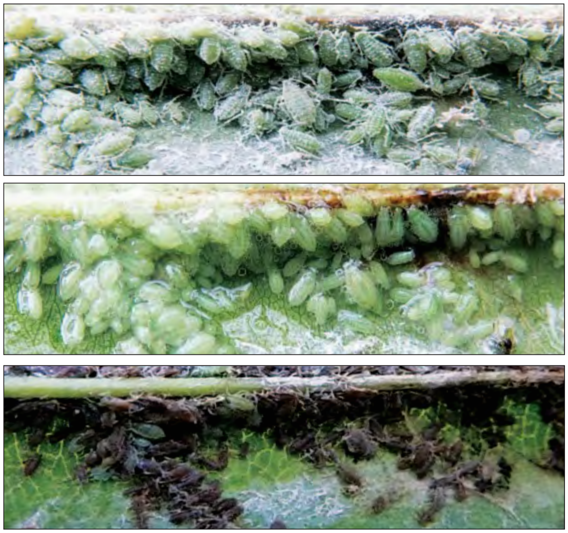
Functions of sodium hydroxide (NaOH)

Sodium hydroxide irritates the skin of insects. It also melts soft skin. So, it shows excellent effects for killing snails and slugs, which cannot be easily controlled. It also exhibits a practical ability to kill most species of moths. The use of sodium hydroxide is very effective in controlling pests that are in close contact with crops. Chemical pesticides are also difficult to control, but sodium hydroxide handles them well. Sodium hydroxide is mixed with a small amount (50ml) of water, shaken to ensure dissolution, and used. It would help if you were careful not to contact the skin when using sodium hydroxide. You can also use potassium hydroxide (KOH) instead of NaOH.

Functions of fine soil

Fine soil refers to uncontaminated fine soil that you can easily obtain anywhere. Rock powder or mud can re-

Mist spraying can reduce the amount of pesticide sprayed and increase the pest and disease control effects (Sun-young Cho). Soft water does not change in color when it is mixed with JWA (left).



These photos show mealy plum aphids located at the back of a leaf of a peach tree. JNP covers these aphids completely, based on the wetting ability of JWA. Nearly 100% of these aphids are killed in approximately 30 hours.

place fine soil. Fine soil helps to increase the control effect by infiltrating and fixing pesticides deeply. Mix 30 times the amount of water in fine soil, stir vigorously, and let it settle for 1 minute, then use the topwater except for the sediment. This method prevents the pesticide nozzles from clogging and leaves no traces on the crop. The use of fine soil has a special control effect when there are hairs or cotton on the surface of pests.

A pest and disease control cycle

A pest and disease control cycle varies according to crops. There are significant differences in the type, timing, and amount of occurrence of disease and pests for each crop. The control method experienced in lettuce cultivation cannot be applied to tomato or cucumber cultivation. This is because lettuce is the crop with the least pests.

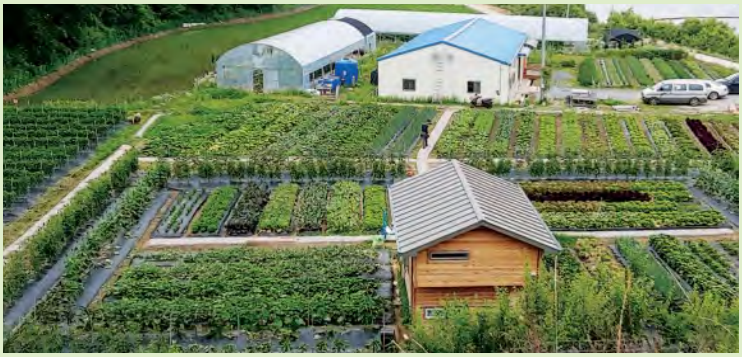
My recommendation is to spray the first pesticide the day after planting. The ratio of the first pesticide to most crops is JS (20ml)+ JWA (200ml) + JHS (200ml). The control cycle is flexibly adjusted according to the conditions, based on a standard of approximately 7 days. It is good to consider the control cycle shorter than 7 days in the early part of cultivation (at this time, there are many aphids) and longer than 7 days in the latter part of cultivation. Pest and disease control can be continuously performed at 1 h-intervals when serious damage is caused or a pest or a disease spreads quickly. When anthracnose occurs, a pest and disease control cycle should be shortened. Therefore, in this case, pest and disease control is conducted at intervals of 1 or 2 days. No separate protective clothing is required when spraying JNP. In the case of pesticides with only NaOH, be careful not to touch the skin. After spraying JNP, the agricultural products can be washed and eaten immediately.

Concentration damage test in advance is essential

All crops may have different conditions by season, growth state, and environment. Before using the JNP in the entire area, mix it at 500ml and test the concentration damage. It is to check whether there is no change in the leaves of crops after 1-2 days have elapsed after JNP is sprayed. In particular, JS can cause concentration damage in some crops.

JADAM Organic Farm in Korea

I grow over 60 kinds of fruity veggies and ten fruits every year to study many pests and disease problems together with my family. I managed to develop a practical solution for almost all pests and diseases using only a farm of 1.5 acres. I have also established a cultivation method that can quickly increase yields with no-tillage. JADAM Ultra-Low-Cost Organic Farming Technology will help advance organic farming around the world.



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Producing JADAM Wetting Agent (JWA)

Inventor : Youngsang Cho

An Overview

- Method: No heating
- Functions: Wetting agent and insecticide
- Applicable plants: The entire plants
- Dilution rate: 30 to 100 times
- Production cost: $1 per 1 L
- Pesticide tolerance: None
- Annual use amount: Approximately 100 L per 1/4ac
- Mixing with a chemical pesticide: Available.
- Expiration date: No
- Damage to bees: Almost none
- Concentration-based damage: Rare
- Storage: -5°C or higher
- Water: Soft water

Production method

JWA is also known as a natural wetting agent. It is the most important part of all pesticides to enhance penetration between pests and crops. JADAM Natural Pesticide is useless without mixing with JWA. Because without JWA, natural pesticides cannot penetrate between pests with the layer of waxy substance. The manufacturing cost of 1 liter of JWA is only $1. JS can be mixed with commercial chemical pesticides, but a concentration damage test must be performed in advance. It is also possible to substitute for machine emulsifiers or chemical emulsifying agents. The color of JWA gets darker and improves the functionality as time passes. JWA manufacturing technology makes it very easy to make natural soaps and natural cosmetics. If you use NaOH instead of KOH, you get a solid soap right away.

❶ Wash a heat-resistant plastic (PE) 110 L container thoroughly. Add 2.5 L (kg) of water, and then add 3.2 kg of potassium hydroxide (90%) accurately. Close the lid and dissolve the mixture completely by turning the container at an angle. Ensure to use water (soft water) in which JWA can be dissolved completely.

❷ Add 18 L of canola oil and stir the mixture with an electric drill until it appears like dilute mayonnaise for approximately 10 min. Pay attention to prevent the mixture from splashing during the stirring process. Stir the mixture sufficiently for 10 min or longer in summer. Stirring should be performed with a drill, and stirring with hands is not allowed. When using a rechargeable drill, increase the stirring time.

❸ When the mixture is aged for 3 days in the PE container covered with a lid, it hardens like butter. If the mixture does not harden or shows separate layers after the aging process, re-stir it with an electric drill until it becomes like mayonnaise. The aforementioned processes should be conducted in a warm place during winter.

④ Add 20 L of water and use an electric drill to divide the mass sticking to the bottom of the container into small portions. Excessive stirring should be avoided as it can result in the formation of white cream like mixture.

⑤ Add 60 L of water and use a clean and long stick to stir the entire mixture frequently to the bottom of the container. The mixture dissolves slowly for approximately 24 h, and the complete version of JWA is produced. A mass tends to sink when the mixture is made in a cold place. In addition, it can be dissolved more slowly in water. A clean tool should be used in the aforementioned process.

⑥ There is no expiration date for the JWA. It is placed in an enclosed container and used when needed. It can be produced with a reduced ratio. Please refer to the table below.

⑦ Use 5 to 15 L based on 500 L. In terms of a fog machine and a mist blower sprayer, use approximately 500ml based on 17 L.

- Various types of vegetable oils can also be used instead of canola oil. When coconut oil is used, reduce the amount of potassium hydroxide by approximately 15%. Oil for frying and animal oil can also be used, but the effectiveness can decrease when using these oils.

* Reference: JADAM Organic Farming (written by Youngsang Cho, pages 272 to 282)

* A video for production: JADAM Organic Farming on YouTube

* Where to buy ingredient: www.jadam.us

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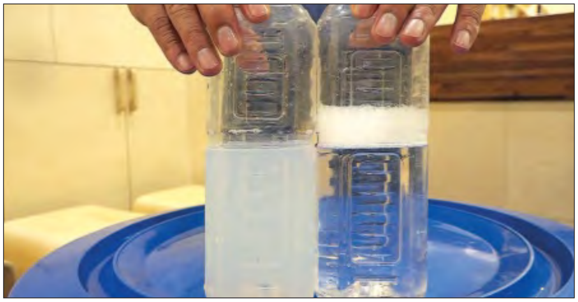
You can use JWA as detergent, dishwasher and soap. Very good cleansing power and good for the skin.

Table of volumes of each ingredient (handy blender can be used for small amounts, 20L = 5.3gal, 15L = 3.96gal)

Making of JWA	**5L** 1.32 gal	**10L** 2.64 gal	**20L** 5.28 gal	**40L** 10.57 gal	**50L** 13.21 gal	**100L** 26.42 gal	
Canola oil	0.9L 0.24 gal	1.8L 0.48 gal	3.6L 0.95 gal	7.2L 1.90 gal	9L 2.38 gal	18L 4.76 gal	
KOH	0.16 kg 0.35 lb	0.32 kg 0.71 lb	0.64 kg 1.41 lb	1.28 kg 2.82 lb	1.6 kg 3.53 lb	3.2 kg 7.05 lb	
Initial water	0.12 L 0.03 gal	0.25 L 0.07 gal	0.5 L 0.13 gal	1 L 0.26 gal	1.25 L 0.33gal	2.5 L 0.66 gal	
Added water	4 L 1.06 gal	8 L 2.11 gal	16 L 4.23 gal	32 L 8.45gal	40 L 10.57 gal	80 L 21.13 gal	

Process of Making JWA (complete in 4 days, without heating)

1. Do a JWA water test to make sure the water is soft water. A small bottle holds JWA sample.

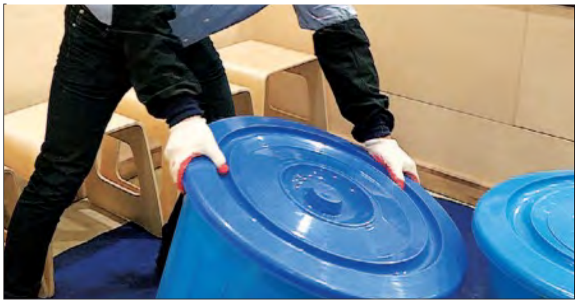


2. Put in a few drops of JWA in 0.5 L of water and shake ; see the changes. Water on the right is suitable for making JWA.

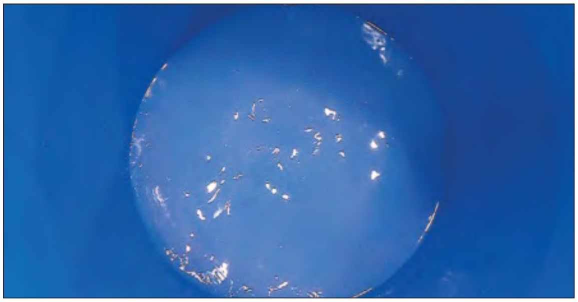
3. Prepare clean heat-resistant plastic container of at least 110 L (29 gal). Do not use smaller ones

4. Measure precisely 2.5 L (84.54 oz) of water and pour it in the container. If you make mistake in exact measurement, you can fail.

5. Put in 3.2 kg (7.05 lb) of potassium hydroxide to the 2.5 L of water.

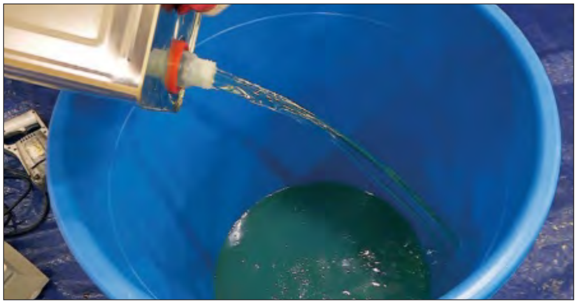


6. Close lid, roll on the side to melt the potassium hydroxide . Be careful of small amount of gas produced.

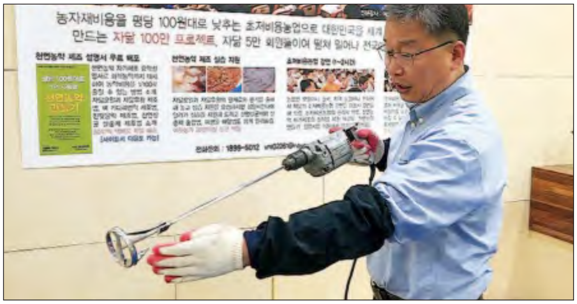


7. Heat is produced when potassium hydroxide meets water. Make sure it has melted completely.

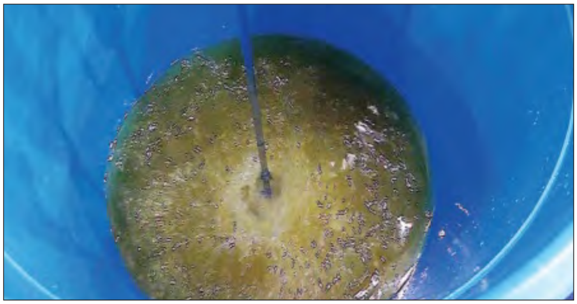
8. Carefully open canola oil can.



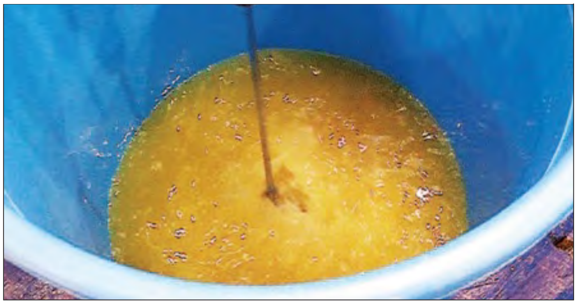
9. Pour in 18 L (4.8 gal) of canola oil.



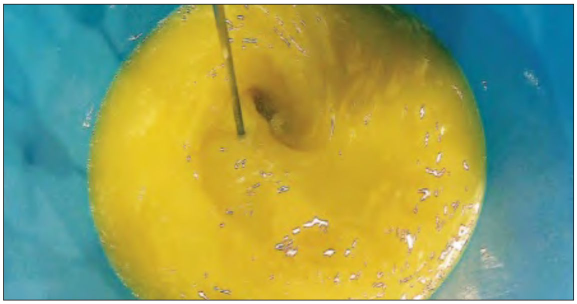
10. Prepare an electric drill. The blade must be very clean. Slower drill prolongs the mixing time.



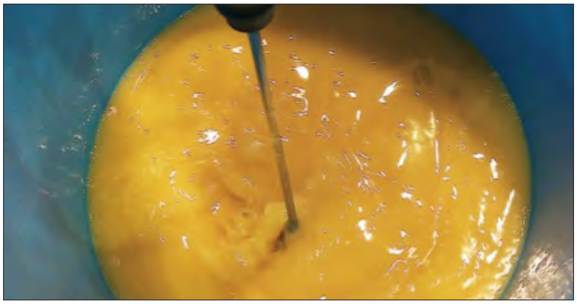
11. If you use a container that is too wide, the depth will be shallow and liquid can splash while drill-mixing



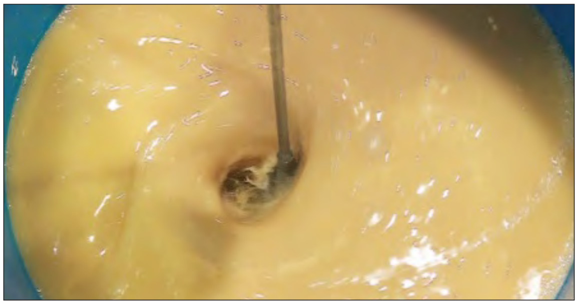
12. Make sure you have gloves and safety goggles on. Observe the color change while mixing.



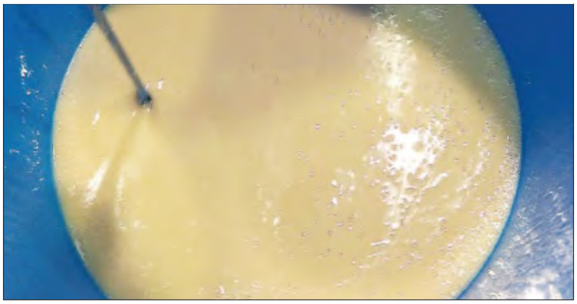
13. Color keeps changing and viscosity increases.
3 minutes passed.



14. Color keeps changing and viscosity increases.
4 minutes passed.

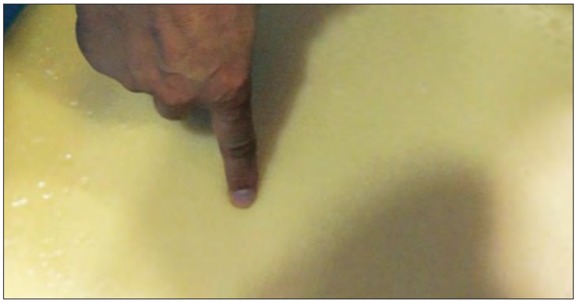


15. Color keeps changing and viscosity increases.
6 minutes passed.

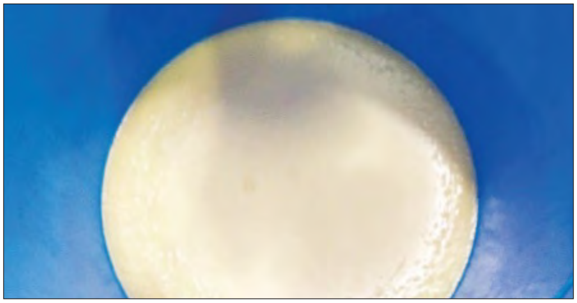


16. Stop mixing when liquid is like thin mayo.
10 minutes passed.

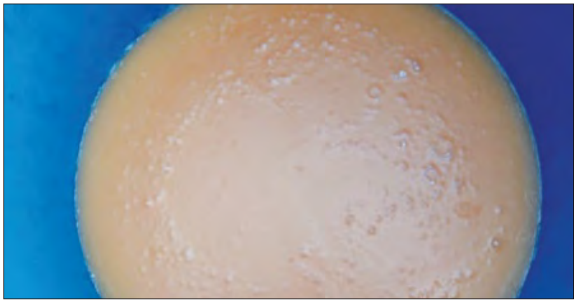
17. Close the lid and let sit for 3 days. Keep in a warm place if possible.



18. It will harden during sitting.



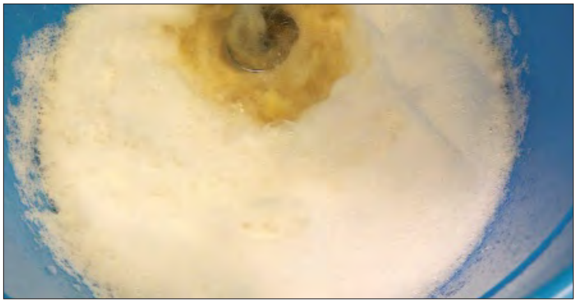
19. During the 3 days of sitting, the temperature slowly rises from 60°C (140°F) to 83°C (181°F) and then declines.



20. After 3 days, it will be solid like butter. Color and hardness can differ according to different environmental conditions.

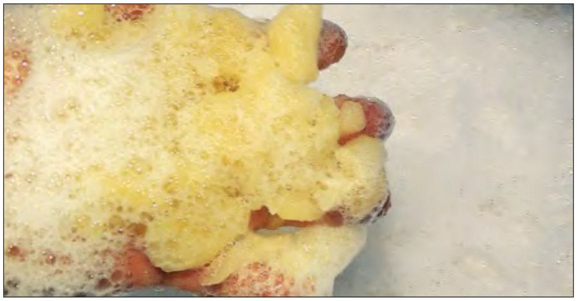
21. Add 20 L (5.3 gal) of water. You must use soft water that passed JWA water test.

22. Use an electric drill to mix thoroughly including the bottom to remove anything that remains stuck to the walls.



23. Do not overmix at this stage; the solution can become like a white cream.

24. Add 60 L (15.9 gal) of water; use a clean wood stick to stir thoroughly with hand.

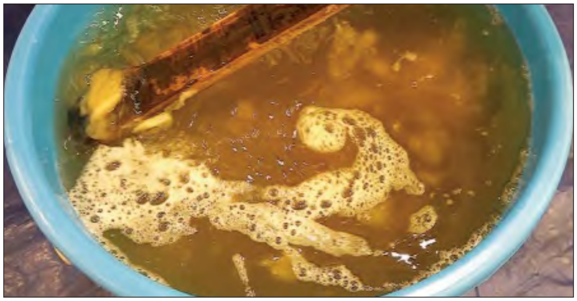


25. These lumps start melting in water. If you are sensitive to skin, do not touch it yourself.

26. In cold weathers, lumps tend to sink to the bottom; stir thoroughly including the bottom

27. If added water is small or the weather is cold, it can melt slowly.

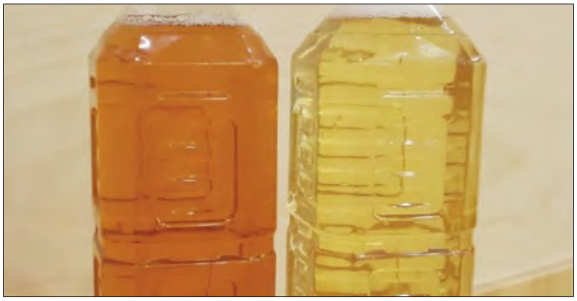
28. Check thoroughly that there are no remaining lumps sticking to the bottom.



29. Almost all will melt 24 hours from 21. At low temperatures, the completion time is longer.

30. Pour water up to 3 cm (1.2 in) below the edge. 4 days passed; it is complete.

31.Tightly close lid and store/use. You can put into separate bottles and store.



32. JWA becomes darker as it ages.

Producing JADAM Sulfur (JS)

Inventor : Youngsang Cho

An Overview

- Method: No heating
- Functions: Germicide and insecticide
- Expiration date: None
- Applicable plants: The entire plants
- Production cost: $ 1 per 1 L
- Dilution rate: 100 to 1,000 times
- Pesticide tolerance: None
- An annual use amount: Approximately 20 L per 1/4ac
- Mixing with a chemical pesticide: Available
- Expiration date: No
- Damage to bees: JS with a dilution rate of 500 times or less to be used
- Concentration damage: Attention needed
- Storage: -5°C or higher
- Water: General water can be used

Production method

JS shows powerful disinfection performance against most pathogens, including anthracnose. In addition, insects do not develop tolerance to JS despite repeated spraying. Unlike a lime-sulfur mixture, JS rarely damages plastic and steel pipes of a greenhouse. It contains 25% of sulfur, and only $1 is required to produce 1 L. It can be mixed with commercial chemical pesticides. Special attention is needed paid to prevent concentration damage to grapes, cherries, persimmons, and crops in a greenhouse. For crops sensitive to JS, use of a 1000-fold dilution is recommended. A test for concentration damage should be conducted in advance before JS is utilized for the first time.

❶ Add 25 kg of sulfur (99%), 0.5 kg of phyllite, 0.5 kg of loess, and 1.5 kg of sea salt in a heat-resistant plastic (PE) container of 110 L. This container must be used because unlike general containers, it is not vulnerable to heat. The production order must be followed. Phyllite and loess can be replaced with rock powder or mud. Sea salt can be replaced with rock salt. When JS is manufactured with Sulfur (90%), a lot of residue is generated. Choose 99% Sulfur. The use of phyllite is to increase the mineral content, and you can make JS without using it.

❷ Add 20 kg of sodium hydroxide (98%). Subsequently, add 50 L (kg) of water at a time. At a temperature of 26°C (79°F) or higher, 54 L (kg) of water should be added at a time.

❸ Stir slowly using a long wooden stick, measuring approximately 1.2 m in length, to mix them with water evenly from the bottom. Attention should be paid to maintain safety because the mixture can boil over when temperature is high or a small quantity of water is added. Perform the aforementioned process by wearing long rubber gloves and safety glasses, clothing, and shoes.

④ As heat exceeds 80°C, sulfur begins melting. Prepare 1 to 2 L of water to prevent an overflow. Add it when needed.

⑤ Stir sulfur with a stick thoroughly to melt it completely and check if there is any unmelted sulfur at the bottom. Sulfur melts completely in approximately 20 min at high temperature.

⑥ Add 32 L of water (Use 28L when you first add 54L) and stir it evenly. After precipitating the mixture for 1 or 2 days, exclude the sediment. Put the mixture without sediment in a thick PE container, and enclose the container when the mixture is not used. Use a part mixed with sediment after filtering it with non-woven fabric. There is no expiration date.

⑦ Use 0.5 to 2 L of the mixture based on 500 L, 0.5 L or more in a greenhouse, and 0.8 L or more in an open field. The amount can be added in batches of 0.2 L each time, when needed. Use 0.5 L for grapes, persimmons, walnuts, pumpkins, and sesame leaves. Use 1 L during a blooming period of fruit trees. In terms of a fog machine and a mist blower sprayer, use approximately 50 ml based on 17 L. The mixture can be produced with a reduced ratio. Please refer to the table below.

⑧ JS is used when a disease may occur or occurs.

Spray bottle with JS diluted 20 times with water. JS is effective for skin diseases such as athlete's foot. Careful if you have sensitive skin. It can also be used for skin diseases of livestock.

* Reference: JADAM Organic Farming (written by Youngsang Cho, pages 284 to 297)

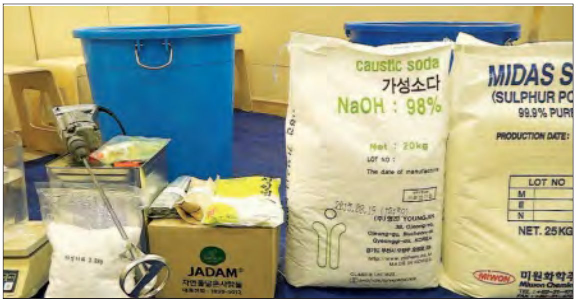
* A video for production: JADAM Organic Farming on YouTube

* Where to buy ingredient: : www.jadam.us

Table of volumes of each ingredient (20L = 5.3gal, 15L = 3.96ga l)

Making of JS	**5L** 1.32 gal	**10L** 2.64 gal	**20L** 5.28 gal	**40L** 10.57 gal	**50L** 13.21 gal	**100L** 26.42 gal	
Sulfur	1.25 kg 2.76 lb	2.5 kg 5.51 lb	5 kg 11.02 lb	10 kg 22.05 lb	12.5 kg 27.56 lb	25 kg 55.12lb	
NaOH	1 kg 2.20 lb	2 kg 4.41 lb	4 kg 8.82 lb	8 kg 17.64 lb	10 kg 22.05 lb	20 kg 44.09 lb	
Initial water	2.5 L 0.66 gal	5 L 1.32 gal	10 L 2.64 gal	20 L 5.28 gal	25 L 6.60 gal	50 L 13.21 gal	
Added water	1.6 L 0.43 gal	3.2 L 0.85 gal	6.4 L 1.69 gal	12.8 L 3.38 gal	16.5 L 4.36 gal	32 L 8.45 gal	

Process of making JS (complete in 24 hours, without heating)


caustic soda
가성소다
NaOH : 98%
MIDAS S
(SULPHUR PO
99.9% PURI
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JADAM

1.These are ingredients for making JS. Work in a well-ventilated location.

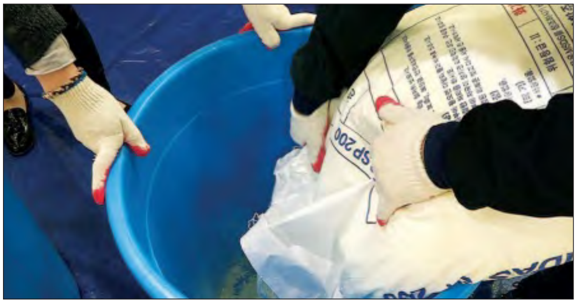
2. Wear safety gloves and boots.

3. Wear safety goggles.

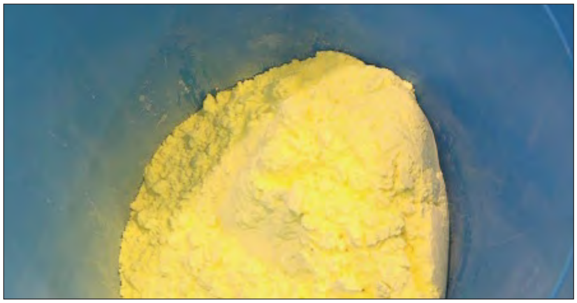
4. Wear mask for safety.

5. Have two containers ready.

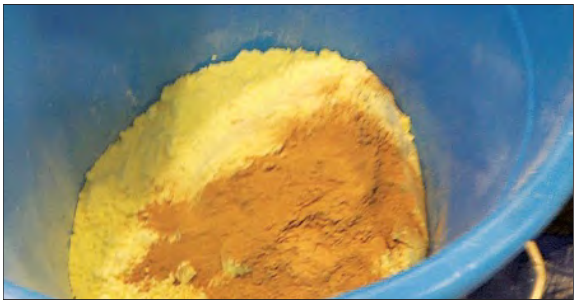
6. Prepare 50 L (13.2 gal) of water in one container. Prepare 54 L (14.3 gal) if the weather is hotter than 26℃ (79˚F).



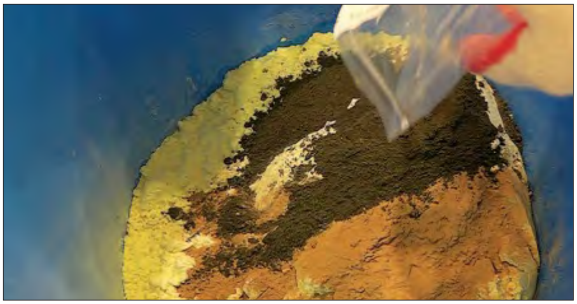
7.Add 25 kg (55.1 lb, 99.9%) of sulfur. Do it slowly.



8. Strictly adhere to the sequence.



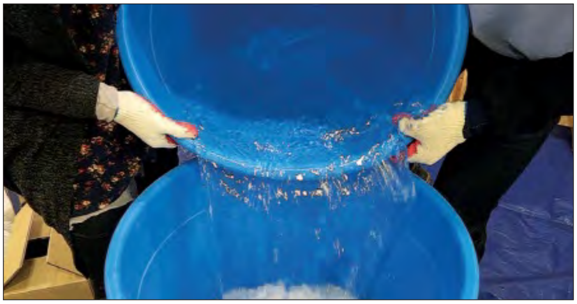
9. Add 0.5 kg (1.1 lb) of fine soil. If you do not have fine soil, use very fine soil.



10. Add 0.5 kg (1.1 lb)of phyllite powder. This can also be replaced with very fine soil. This powder makes JS clear.

11. Add 1.5 kg (3.3 lb) of sea salt. Rock powder and sea salt reinforces minerals.

12. Add 20 kg (44.1 lb, 98%) of sodium hydroxide. Do it slowly so that dust does not form.

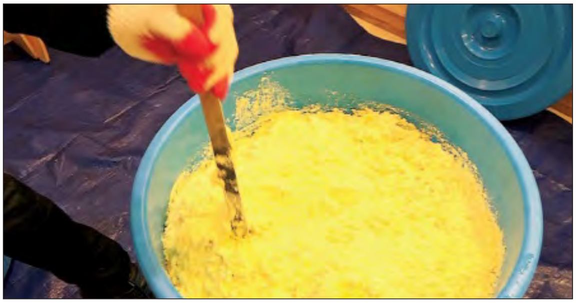


13. Add water all at once as overheating may occur.

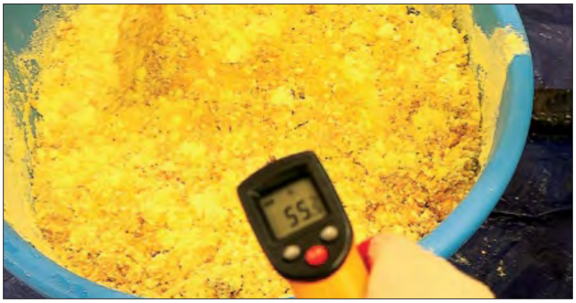
14.After the water has been filled, use the wooden stick to stir slowly and thoroughly. Particularly stir the bottom so nothing is left un-melted.

15. Use the wooden stick about twice the depth of the container.

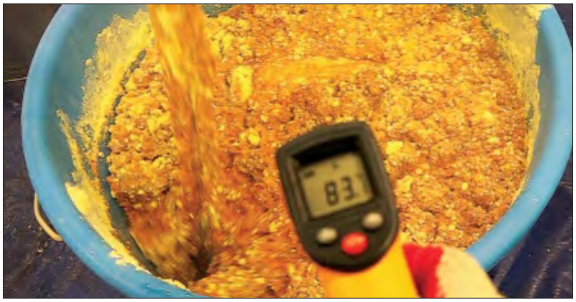
16. Stir thoroughly to melt all the sulfur at the bottom.



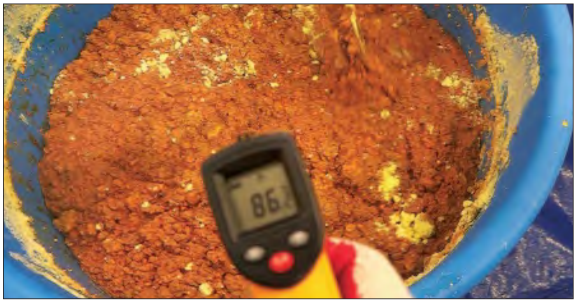
17. Sulfur rises to surface.



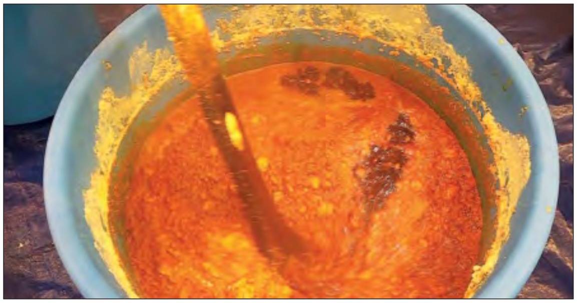
18. Keep stirring and the temperature keeps rising. 3 minutes passed.



19. When the temperature exceeds 80℃ (176˚F), sulfur starts to melt. 4 minutes passed.

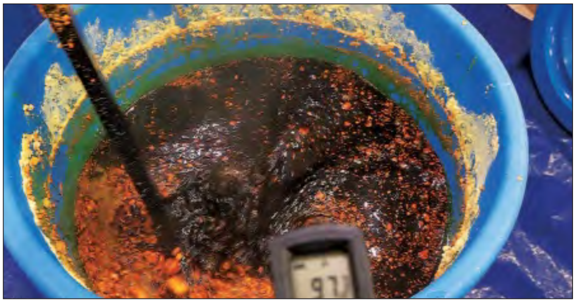


20. Temperature approaches 90℃ (194˚F), melting is accelerated. 5 minutes passed.

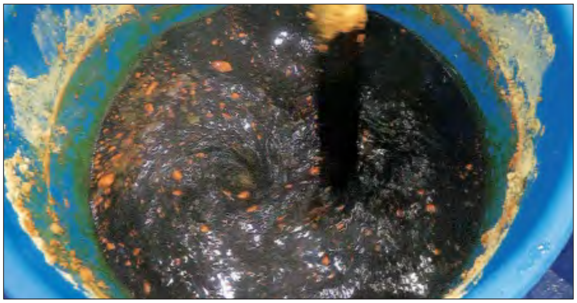


21. Liquefied sulfur becomes visible. 6 minutes passed.

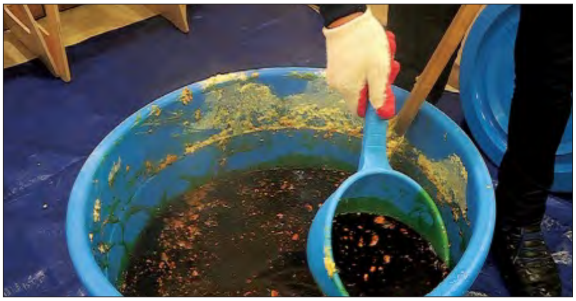
22. If water is too little or weather is too hot, it can over-boil. Have 2 L (0.53 gal) of water handy to pour in that case.



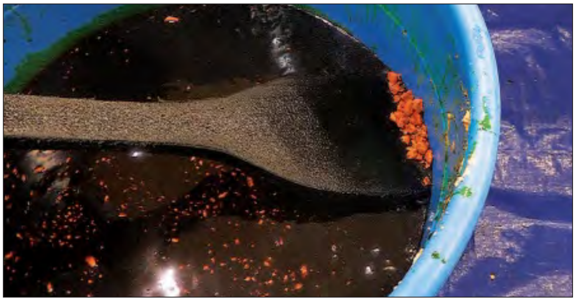
23.Temperature approaching 100℃ (212˚F). Keep stirring.



24. Keep stirring in a circular motion. 10 minutes passed.



25. Use a big ladle or dipper to wash off all the sulfur on the walls.



26. Keep checking the bottom to make sure no sulfur is left.

27. Mix while it is hot to melt sulfur.

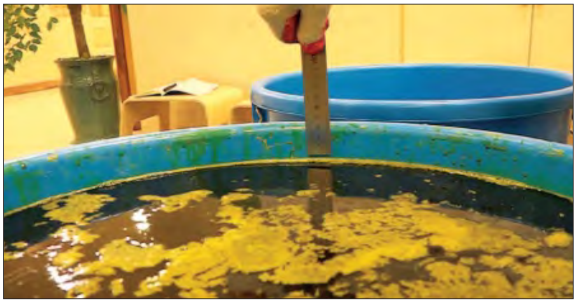
28. There are small particles of sulfur on the surface. The temperature started to drop. 15 minutes passed.

29. You can also stir with an electric drill. However, using drills from the beginning is dangerous.

30. No sulfur is left on the bottom.

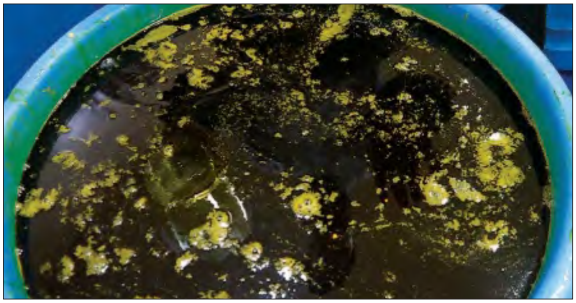
31. Sulfur has melted completely. Sulfur content is 40%. If you leave it as is, crystals will form when cold.

32. Add the second water of 32 L (8.45 gal). Add 28 L (7.4 gal) if the first water was 54 L (14.3 gal).

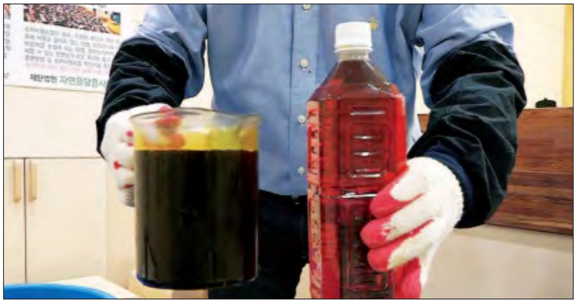


33. For 110 L (29 gal) containers, the solution will fill up to about 3 cm (1.2 in) below the edge.

34.Stir well for the last time.



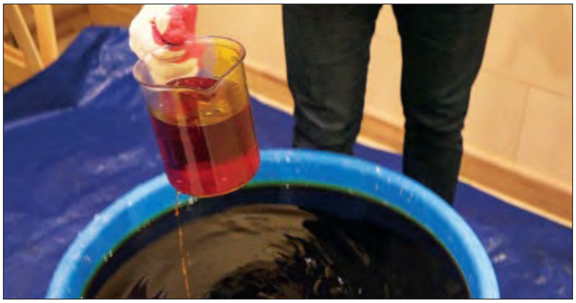
35.100 L (26.4 gal) of JS has been completed.



36.JS appears black before settling.

37. Closethe the lid and let settle for 24 hours.

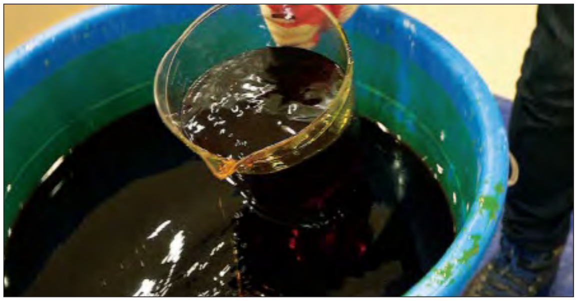
38. Settling for 24 hours. 24 hours passed.



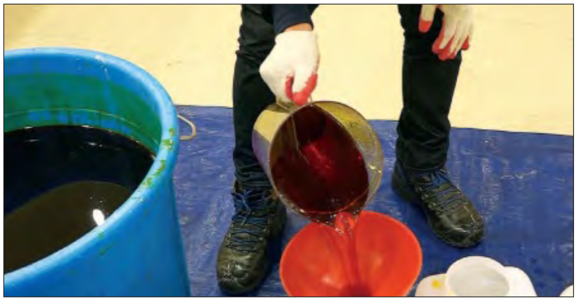
39. JS from the upper portion. The mixture of phyllite, fine soil and sea salt gives you this clear sulfur solution.

40. Do not keep the JS in the container it was made. Place them in separate bottles. Do not use thin-walled bottles for storage.

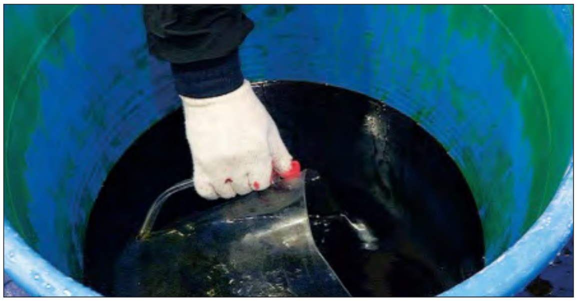
41.This thick-walled container is good for storing JS.



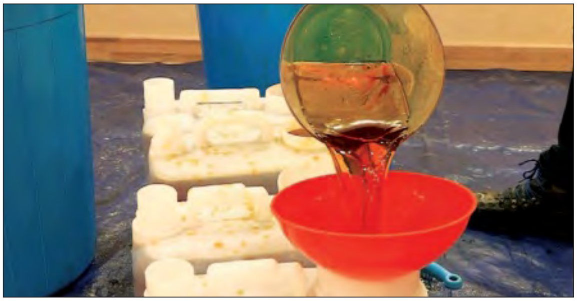
42.Take out the upper portion being careful not to agitate the sediments.



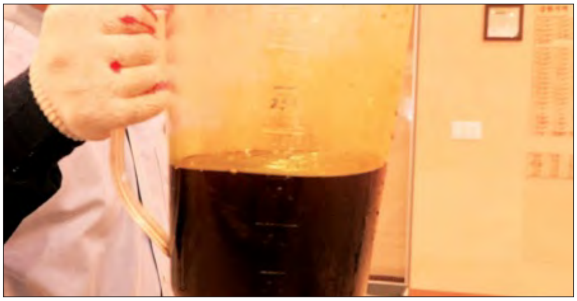
43. Place in storage containers. Have 5 containers (20 L or 5.3 gal size) ready.



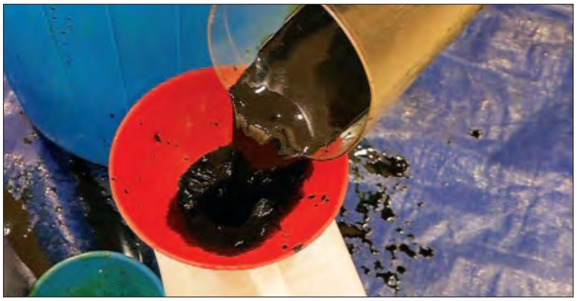
44. As you go deeper, take more care that the deposits do not rise.



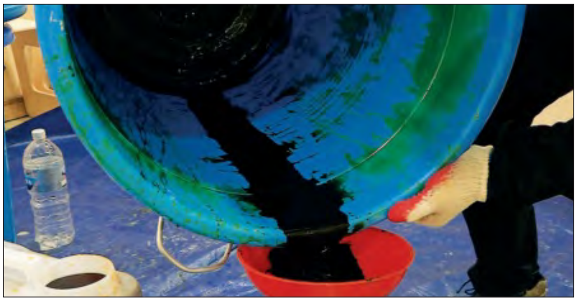
45. We obtained 80 L (21.1 gal) of clear JS through settling.



46. This is JS with sediments after taking out 80 L (21.1 gal) of clear JS.

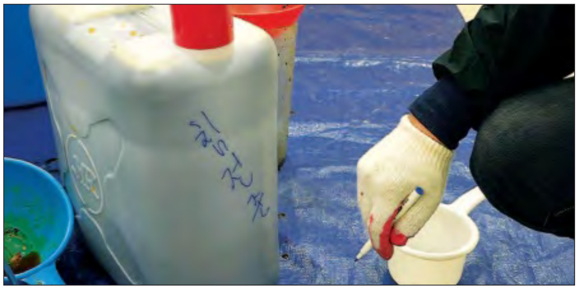


47. Also, pour JS with sediments into a storage container. If you do not use phyllite, there will be no sediment.



48. Transfer everything that is left in the container to the storage container.

49. What remain at the bottom of the container are phyllite and red clay powders that have not melted completely.



50.The storage container with sediments should be marked separately and let settle again.

51. Seal containers air-tight. If JS comes in contact with air, it can form white crystals.

52. JS in a bottle with a sulfur content of 25%.

JADAM Sulfur Analysis Result

pH	EC (1:5) ds/m	OM %	T-C %	T-N %
11.6	79.55	2.02	1.17	0.18
C/N %	P_2O_5 %	**S** %	CaO %	MgO %
11.37	0.043	**24.6**	0.005	-
Na_2O %	Fe mg·kg^{-1}	Mn mg·kg^{-1}	Zn mg·kg^{-1}	Cu mg·kg^{-1}
15.650	5.307	-	1.747	0.907
Cd mg·kg^{-1}	Cr mg·kg^{-1}	Ni mg·kg^{-1}	Pb mg·kg^{-1}	As mg·kg^{-1}
-	0.04	-	-	-

Producing JADAM Herb Solution (JHS)

Discoverer : Youngsang Cho

An overview

- Functions: Insecticide and repellency
- Applicable plants: The entire plant
- Dilution rate: 25 to 100 times
- Pesticide tolerance: None
- An annual use amount: Approximately 150 L per 1/4ac
- Mixing with a chemical pesticide: Available
- Expiration date: 1~2years(Sterile vacuum storage)
- Water: Soft water
- Damage to bees: rare
- Concentration damage: rare
- Storage: -5°C or higher under the condition of vacuous disinfection

Production method

Most herbs, such as rosemary and mint, show significant insecticidal effects on small-sized aphids and mites. Pokeweed, artichoke, bracken, ginkgo, and oleander are also used to kill moths. Artichoke or bracken are basically used for insecticide. When these plants do not exhibit effective insecticide performance, ginkgo or oleander are used instead. When there is no herbal solution, sodium hydroxide (20 to 60 g based on 20 L) can be used instead. However, constant use of sodium hydroxide (NaOH) can result in damage to plants or reduced quality, depending on the plants.

Plantation of ginkgo trees is encouraged as it shows powerful insecticide and repellency effects. It is more effective to select a fruit-bearing ginkgo tree. Leaves of ginkgo trees show considerable insecticide and repellency effects, and ginkgo berries boiled water exhibits excellent insecticide and repellency effects against most harmful insects.

It takes approximately 8 years to check whether a ginkgo tree planted bears ginkgo berries. For this reason, a seedling that is confirmed to bear ginkgo berries should be selected. Ginkgo branches can be planted as cuttage. I bought and tested commercially available insecticides based on neem oil, pyrethrum oil, and other substances. Based on the test results, I found that the JADAM method, using surrounding wild plants, exhibited superior effects when compared with the aforementioned insecticides. In short, the best insecticide is a natural insecticide that can be found around us.

❶ Place herbal plants in a fine net and put the net in a container used for boiling. Place a heavy stone on the net to prevent it from floating on water and fill the container with water. For this step, soft water must be used to dissolve along with JWA to obtain a clear solution. 5L of water is used for 1 kg of fresh herbal plants and 20L of water is used for 1 kg of dry herbal plants.

❷ Boiling should be performed for 4 h or longer in a pressure cooker or a double boiler and for 5 h or longer in a general container. Initially, water is boiled over high heat. Then bring to a boil over a small fire. Through this process, approximately 60% of the entire water put in the container is obtained as a herbal solution. A method for producing a large amount of a herbal solution based on an electric heater can be checked out on the official JADAM website. Approximately 30 h are required to collect a herbal solution of 300 L when using a 600 L container and two 3 kw electric water heaters.

❸ To store the herbal solution produced under a disinfection condition and use it for a long term, pour it into a heat-resistant container or juice bottle and fill it to the brim while the solution is in the boiling state. When it is stored in the shade at room temperature and conditions of disinfection are maintained, it can be used for 1–2 years. When ethanol is added as much as 15% of the entire herbal solution, the solution can be stored in the container for a long time without the need for disinfection.

❹ If it is necessary to use a stored herbal solution, use the upper part of the container bottom sediment

❺ Use 5 to 30 L based on 500 L. In terms of a mist blower sprayer. use approximately 1 L based on 17 L.

* Reference:

- JADAM Organic Farming (written by Youngsang Cho, pages 284 to 297)
- 100 Herbs for Pesticide (427pages, Written by Geol Yu)

* A video for production: JADAM Organic Farming on YouTube

* Where to buy raw materials: www.jadam.us

Gingko. This tree has the perfect defense mechanism against pests and diseases. Use fresh leaves, fallen leaves and berries. The more the ginkgo berries, the stronger became the natural pesticide. Almost all pests can be suppressed. The pest repellent effect is also excellent.

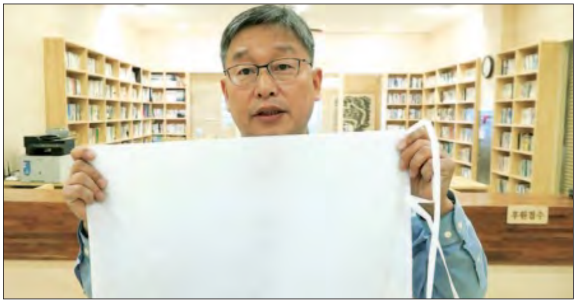
Process of Making JHS

1.This is commercially available dried Korean pasque flower root (KPFR).

2. Mark issued by Korean Ministry of Food and Drug Safety approving good medical practice.

3. Prepare 100 L (26.4 gal) container and gas burner. Work in a well-ventilated area.

4. Add 75 L (19.8 gal) of water to boil 3 kg (6.6 lb) of dried KPFR.



5. Prepare a fine mesh bag (60×70 cm, 24×28 in). Easily available on the internet.

6. Put KPFR in a mesh bag.

7. Put in heavy rocks or brick in the bag to sink it.

8. Tie the bag and put it in water.

9. Start the fire at high.

10. As temperature rises, white foam is seen.

11. Keep high heat until boil.

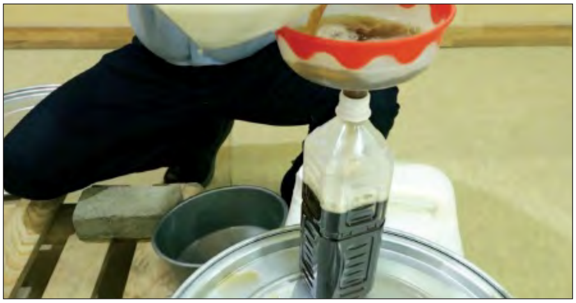
12. Leave the lid slightly open so that the contents do not spill out.

13. Reduce to medium heat. If you keep boiling in high heat, too much liquid will be lost through evaporation.

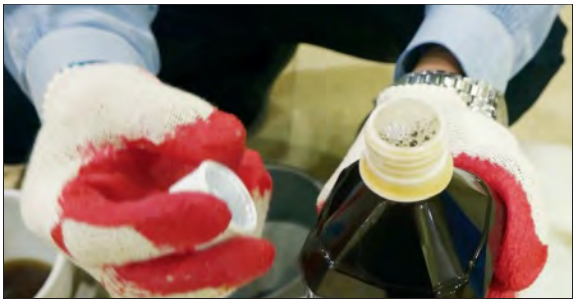
14. Maintain a gentle boil.

15. Take out the bag after approx. 5 hrs.

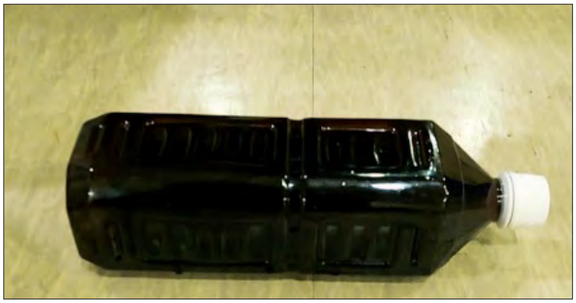
16. Keep water slightly boiling for disinfection as you take the liquid for storage.



17. Put the JHS in heat-resistant bottles.

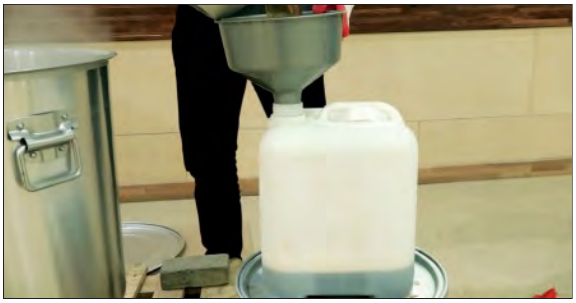


18. Make sure the liquid is completely full. Squeeze slightly until no air is left, then seal with lid.



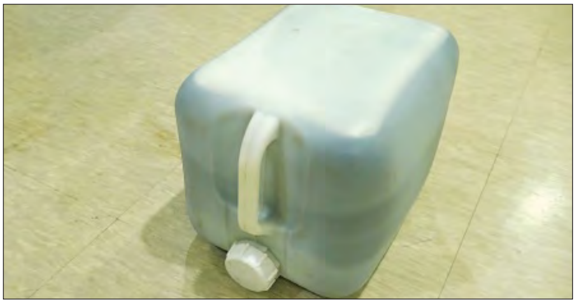
19. Immediately lay the bottle on its side. Hot liquid will enter the small air pockets around the lid and disinfect it completely.

20. For large farms, use large containers like this one. Use heat-resistant ones with a tight lid.



21. Pour slowly; if you pour fast there will be many bubbles.

22. Fill up as much as you can. You can also mix 15% ethyl alcohol and store it at room temperature.

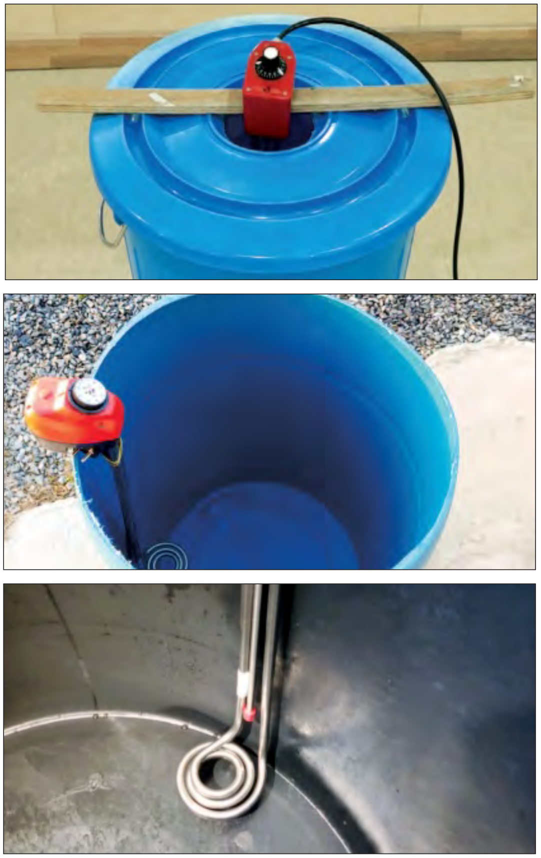


23. Lay on its side for 30 minutes. Place in cold storage for long term keeping.

24. There is almost nothing remaining in the pot if you use mesh bag.

Making JHS by Using an Electric Heater

Approximately 30 hours for a 600L container



Choose an electric heater of sufficient size to reach the bottom of the vessel. One 1.5 kw electric heater in a 100 L(26 gals) container, one 3 kw electric heater in a 200L (52 gasl) container, For 600L (158 gals) containers, two 3kw electric heaters are suitable.

WOOJU
ELECTRIC HEATER
3K
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OFF
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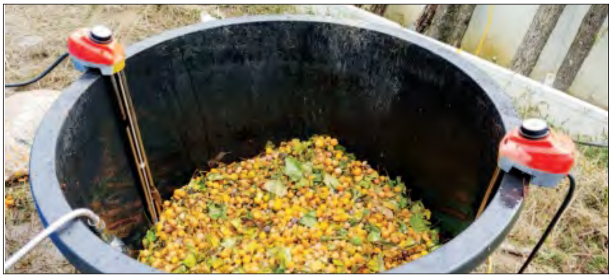
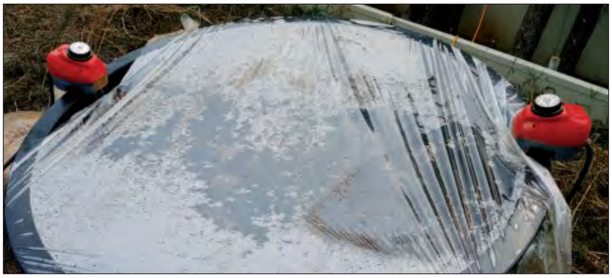
20
40
60
80
100
120

Set the temperature between 105 and 120 degrees celsius. Efforts should be made to prevent overboiling and overflowing.



1. Fruit of ginkgo was filled up to 1/2 in 600L container. The leaves are full. Fill up the water.



2. Be sure to cover the plastic and make a small air outlet. After 10 hours, it starts boiling.

3. It is completed in about 30 hours. Do not turn off the electric heater and put it in the container.

4. The process of putting the JHS into the container is publicly available in video

Cultivating JADAM Microorganism Solution (JMS)

Inventor: Youngsang Cho

An overview

- Method: No heating
- Functions: Prevention of pathogen
- Expiration date: Use instantly after cultivation
- Applicable plants: The entire plants
- Production cost: $0.3 per 1 L
- Dilution rate: 20 to 100 times
- Expiration date: Use immediately upon completion
- Water: Use soft water for foliar application, and use general water for irrigation.
- Damage to bees: None
- Concentration damage: None

Production method

Millions of microorganisms native to local environments live in the leaf mold soil under the fallen leaves in adjacent mountains. Microorganisms can be easily cultivated using leaf mold soil as a source of cultivation and boiled potatoes as a culture medium and adding sea salt. If a microorganism cultivation solution is added extensively before plants are planted and regularly during a plant cultivation process, the soil pollution in soil reduces. This significantly supports the rooting of plants and prevents the occurrence of soil nematodes, fusarium wilt, and epidemics. Microorganisms can be cultivated using general water. However, soft water is used for microorganism cultivation when applying JMS to the foliar surface, and you need to mix it with JWA. Frequent use of JMS encourages rooting of plants, thereby significantly increasing the amount of crop yield. Moreover, farming and harvesting can be successfully performed, despite mono-cropping, through a process of putting residues of plants in the soil again and applying JMS.

❶ Add small volume water to 1 kg of boiled potatoes, mix in a blender, and put the mixture in a fine net. Add 500 g of leaf mold soil and 500 g of sea salt. Insert the fine net in water and shake it to spread the content evenly. After the content is completely spread, remove the net from the water. 500 g of sea salt can be replaced with seawater (20 L) or rock salt (500 g).

❷ Fruits, stems, and leaves of plants cultivated can be ground with a blender and put with potatoes in the fine net. Through this process, microorganisms optimized for plants can be cultivated.

❸ The cultivation process is conducted in the sunlight in a container covered with a lid. Room temperature is established as the standard cultivation temperature in that it is the consistent temperature directly affecting plants. Approximately 1 to 3 days are required to complete the microorganism cultivation process, but the amount of time required varies. In summer, the microorganism cultivation time is shortened and the amount of bubbles generated increase. When the water temperature at night decreases to 18℃ or lower, an electric heater is used to maintain the entire water temperature to be approximately 20℃ for the microorganism cultivation process.

❹ The optimal time point at which the microorganisms can be used is when bubbles are clearly formed on the water surface, as shown in the photo above. Bubble forms differ according to the environment, and bubbles break gradually a day after. When bubbles disappear, microorganisms cannot be used anymore. In this case, you can use it as liquid fertilizer by diluting 10 times or higher.

❺ The complete microorganism cultivation solution is diluted 10 times or higher with water to use the entire volume of the solution produced. When 500 L of JMS is diluted with water, it can be applied to land covering 10ha. When there are no crops in the field, undiluted JMS solution can be applied.

❻ While irrigating JMS, use a filter (120 mesh) to prevent clogging drip hose or the nozzle. For foliar spraying put 20 L of JMS with 3L of JWA based on the 500 L of soft water. Microorganism cultivation can be performed with a reduced ratio. When growing crops in the field, dilute JMS 10 times or more, and when there are no crops, you can spray or irrigate the undiluted solution. Excessive use of JMS can be detrimental to crops.

* Reference: JADAM Organic Farming (written by Youngsang Cho, pages 160 to 184)

* A video for production: JADAM Organic Farming on YouTube

If there is no leaf mold soil : Put a variety of grass on the soil and sprinkle water frequently. Microorganisms propagate on soil surface and the soil turns soft. Use it as leaf mold soil; it is an excellent starter.

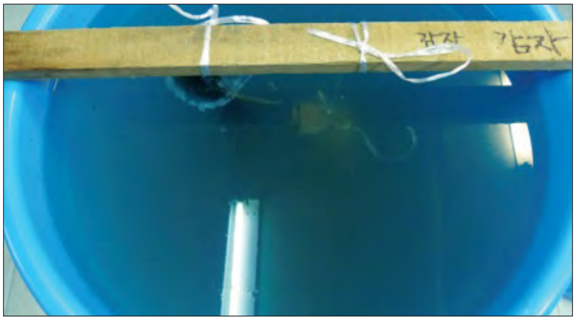
Culturing at Ambient Temperature (Daytime temperature 25℃ (77℉), 72 hrs)

1. Prepare 1 kg (2.2 lb) of boiled potato for 500 L (132 gal) of water.

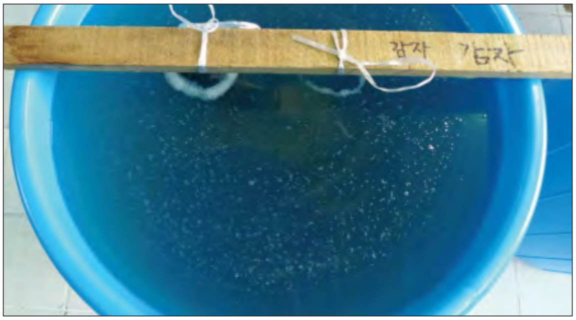
2. Put potatoes in cotton bag and knead until potatoes fully melt into the water. You can use blender.

3. Put leaf mold soil and rocks in cotton bag and knead so that the leaf mold soil melts into the water.

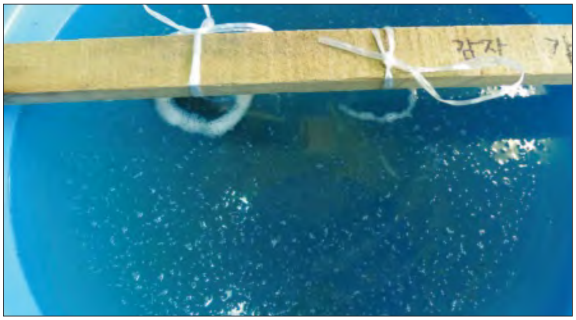
4. Let's make it easier. Put some water in boiled potatoes, grind them in a hand mixer, put them in a nylon net together with leaf mold soil and salt, and let them loosen in water.



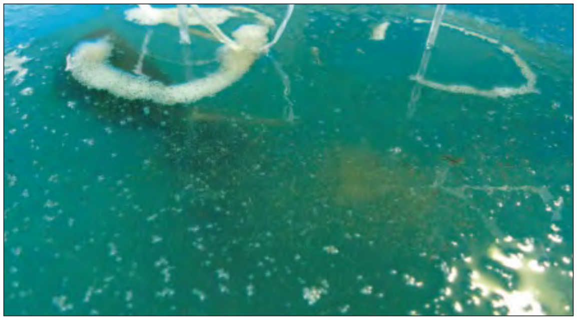
5. As microbes feed on potatoes and sea salt, bubbles start to rise. Size of bubbles increases. (32 hrs)



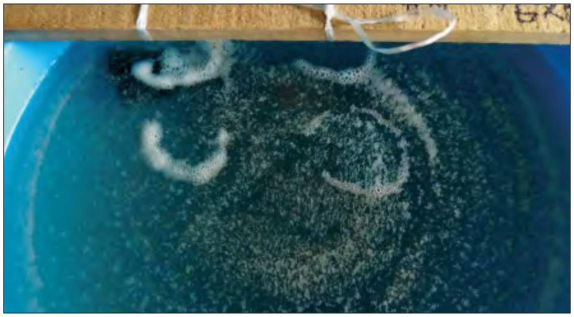
6. Foam will start forming a circle in the center. (46 hrs)



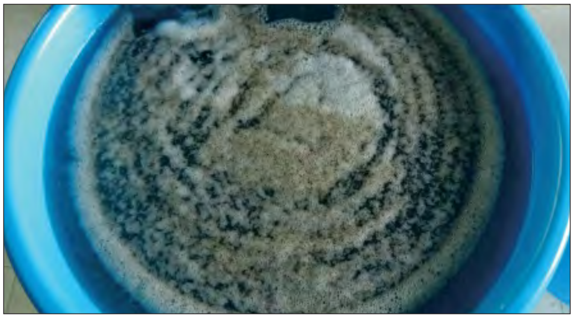
7. Foam becomes more vigorous as microbes keep propagating. (48 hrs)



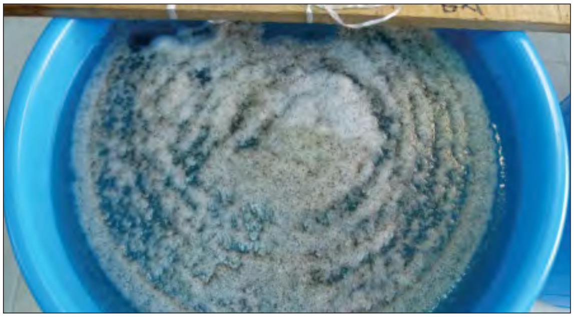
8. Area covered by foam increases, size of bubbles are also bigger. (50 hrs)



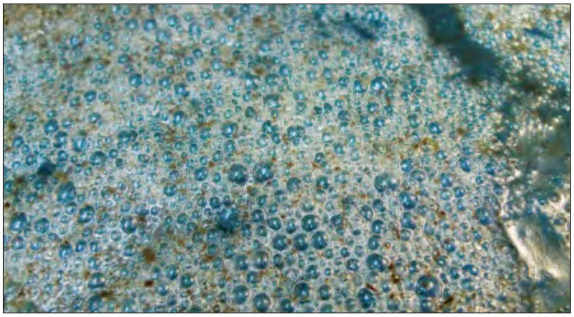
9. Foam is becoming more vigorous. (55 hrs)



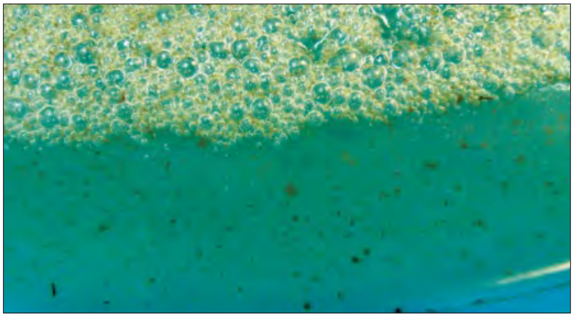
10. Foam displays a clear circle. (67 hrs)
Circularity may not be apparent.



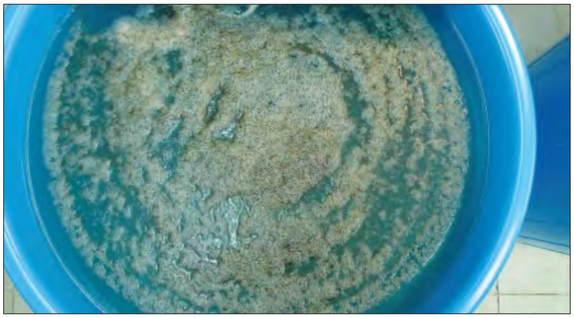
11. Foam is at its peak, forming a pizza-like layer. Cultivation is completed. (72 hrs)



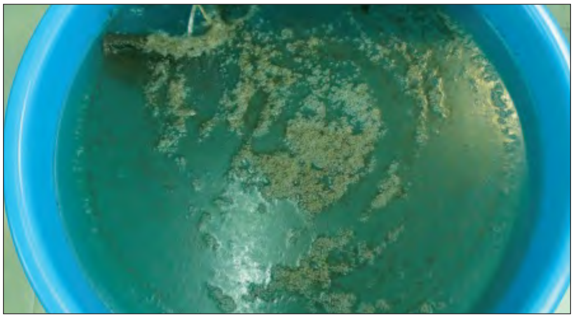
12. Close-up view of the foam. In the tropics it can be completed in about 15 hours.



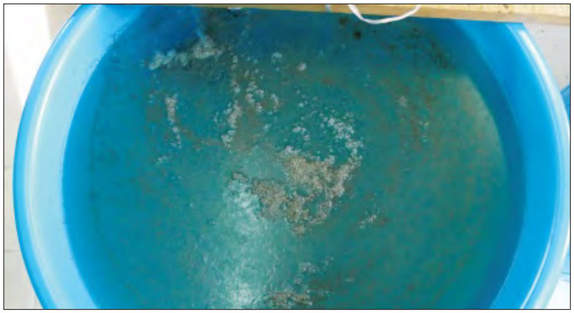
13. The space between container wall and the foam layer indicates that the microbial propagation is still ongoing.



14. Disc of foam starts to crumble; indicating that the microbes are starting to die. (84 hrs)

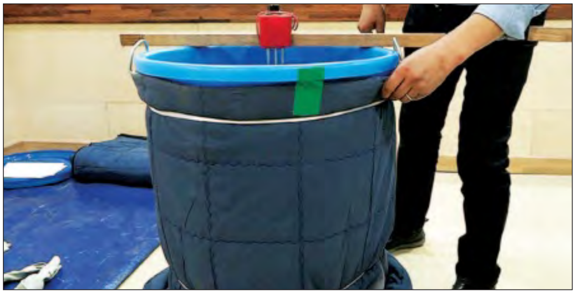


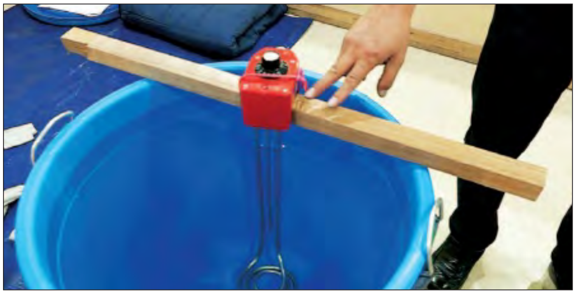
15. All nutrients of medium have been consumed; microbes die faster. (134 hrs)



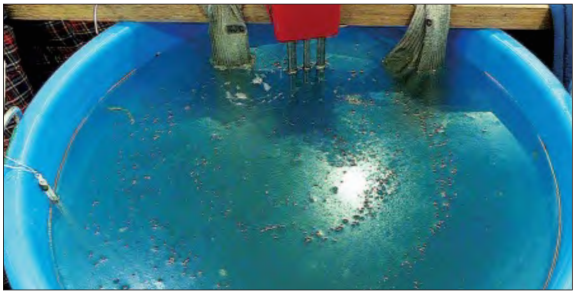
16. All foam has disappeared, leaving behind a film. Microbes have perished. This is not suitable as JMS, but good for liquid fertilizer. (144 hrs)

Culturing Microorganisms in Low Temperatures Where Water Temperature Drops Below 18℃ (64.4℉)


Wrap with insulation so that heat does not escape from the side or bottom.

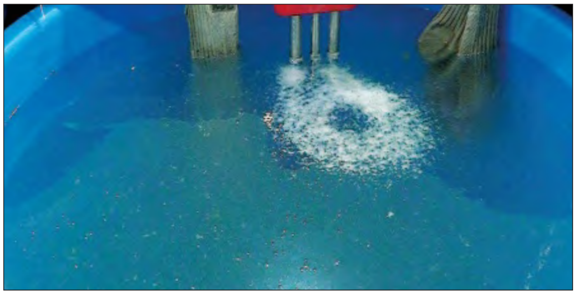

Use 3kw heater for 500 L (132 gal), 1.5kw for 100-300 L (26-79 gal). The heater must touch the floor.

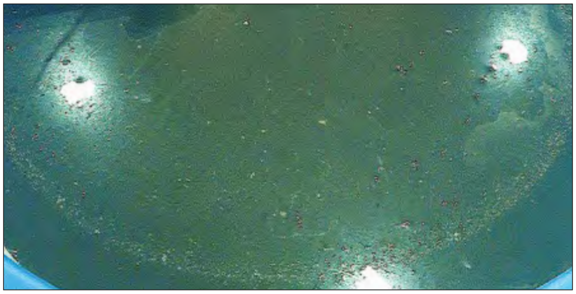
SCH-32
20A
20
Use an ELCB (Earth leakage circuit breaker) for safety; long-time running can cause overheating


Bubbles are forming on the entire surface.

Cover the lid with insulation too.

Set the temperature; as the machine might not be precise, always test in prior.


Culturing microbes at around 20℃ (68°F). The temperature of the whole water should be maintained above 20℃.


A clear disc has formed; it is time for use. (72 hrs passed)

Producing JADAM Surface-Spreading Agent

Inventor: Youngsang Cho

Pesticides have succeeded in developing special pesticides that do not mix with water but spread over the surface of the water. Surface-spreading agents are used to catch insects such as Water rice weevil moving up and down the water, and are sold at very high prices. If you make it yourself, it will cost about $ 2 per 1 L (0.26 gal). Place the surface-spreading agent in the plastic bottle, drill a 5 mm hole in the entrance, and spray it on the water in the low windy dawn. The surface-spreading agent spreads over the surface of the water without getting mixed with water. Passing through the membrane of natural pesticides formed on the water will kill the pests. Prepare a surface-spreading agent in a bottle, mix it before use and spray it.

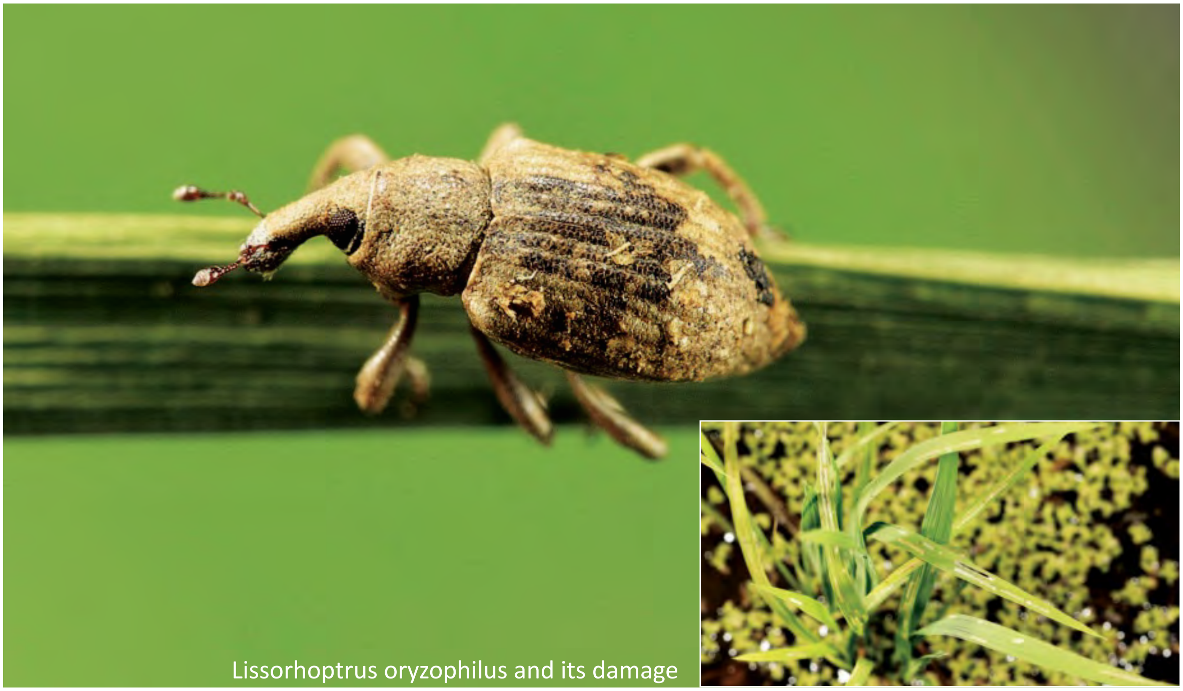
I had to do quite a lot of experimentation to get the ability to spread over the water without getting mixed with water. Here's a quick and easy way to make a surface-spreading Agent. You can store them in 1.5L containers and keep them for a long time. Layer separation occurs in the process of storage. Please shake before use.

1. Mix 3 L (0.8 gal) of JWA in 5 L (1.3 gal) of water; stir well. (Use soft water)

2. Add 0.5 L (0.13 gal) of JS and stir.

3. Add 3 L (0.8 gal) of canola oil and mix with a drill for 10 minutes.

4.The surface-spreading agent was easily completed.



Lissorhoptrus oryzophilus and its damage

5. Spray the undiluted solution onto dikes of the rice paddy in the early morning.

6. Surface-spreading agents that float over the water float over the water miraculously without mixing with water.

7. This mixture is lighter than water and forms a membrane like oil on water.

8. Pests pass through the natural pesticide membrane and die.

Mite

A group of small animals with a body length of 1 to 2 mm. The word mite refers to the apple mite that lives on apples or radish in the apple cultivation area, since 1902, it has been adopted and widely used as the standard language corresponding to the English "mite." Currently, there are more than 1 million species in the mite family of insect that live on the planet, and it is a one of the rarest species, diverse in shape, habitat, and behavior.

In particular, unlike other arachnids, the parasitic behavior of mites are highly evolved. Some species are exclusively parasitic on plants, while others have complex parasitic relationships with vertebrates and invertebrates. In addition, some play a big role in the circulation of nutrients by decomposing plant matter, and others are beneficial to human life by directly or indirectly eating animals that are harmful to humans.

They not only cause economic damage to crops and livestock, but also carry pathogens of animals and plants, which are harmful to the human body. Their habitat spans almost all environments, including deserts, tundra, alpine, caves, hot springs, and under the sea. More than 30,000 species are known so far, but new species are expected to be discovered constantly in the future.
(Doosan Encyclopedia)

Eriophyes kuko kishida

Description

The mite in the gall is so tiny that it cannot be seen with the naked eye in detail and can only be observed with a dissecting microscope.To observe the shape of each part, the use of an optical microscope is necessary. The female is 191.1㎛ and the body is light yellow or yellowish-white.The front leg is 35.3 ㎛ and has 5 feather-shaped claws.And the abdomen has about 78 micro setae.

Life cycle

It begins its parasitic activities from late April to November damaging the leaves until it falls. The overwintered mite lives in leaf bud or dry leaves and gathers for parasitism on leaf bud during warmer weather creating galls on the surface of leaves during May.

The mite is one of few pests that overwinters as an adult. Furthermore, its reproduction occurs 6 to 7 times a year. The first adult mite appears in late May. The life of an adult is around 25 to 30 days.

After wintering, it digs inside of buds. from the 6th day to 15th day, it lays eggs before dying. The larvae hatch from the egg on the 10th day and cause colossal damage along with adult mite. When a black gall occurs on the leaf surface, a tiny mite is observable with an optical microscope inside the gall.

Damage

The black gall appears on the leaf which inhibits the growth of the plant. When there is a new sprout, the adult mite begins to eat from the sprout's backside, and creating black gallon the surface of leaf.

(National Crop Pest Management System/NCPMS)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

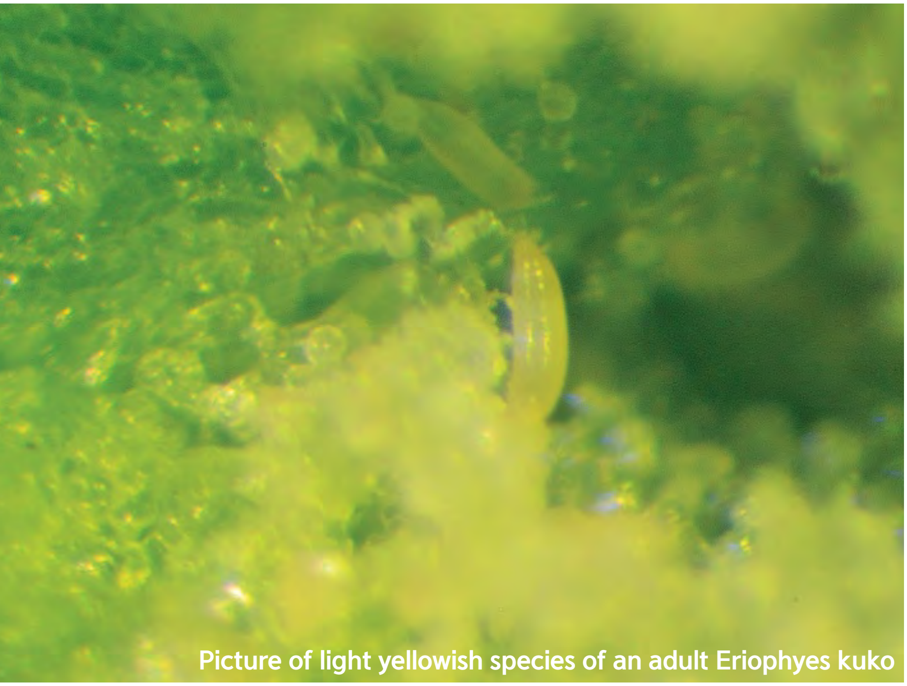
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		60g	80g
Control interval	7days	Visible effect	1day

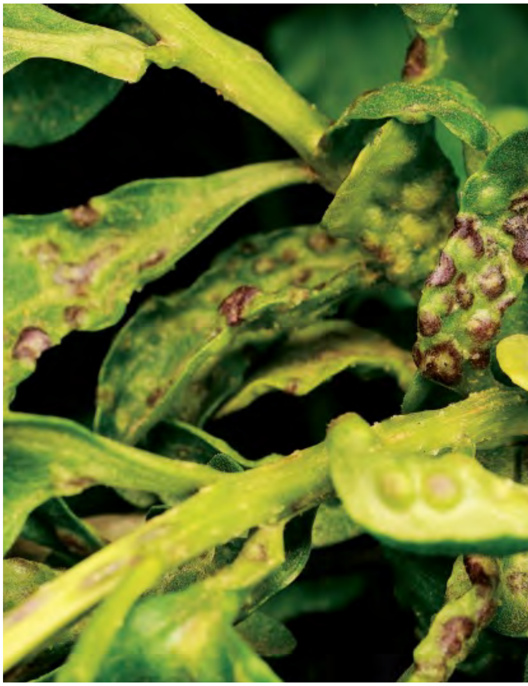
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- It is a very difficult pest to control. When it occurs, spray it 2 to 3 times in a row at intervals of a day.

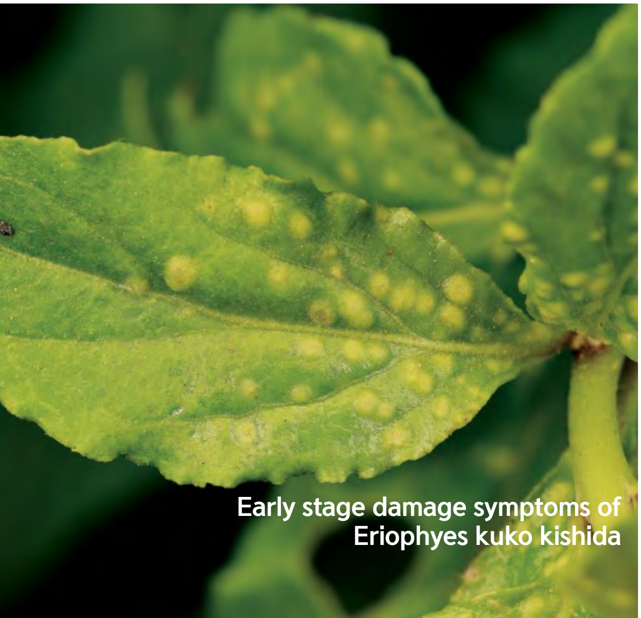
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

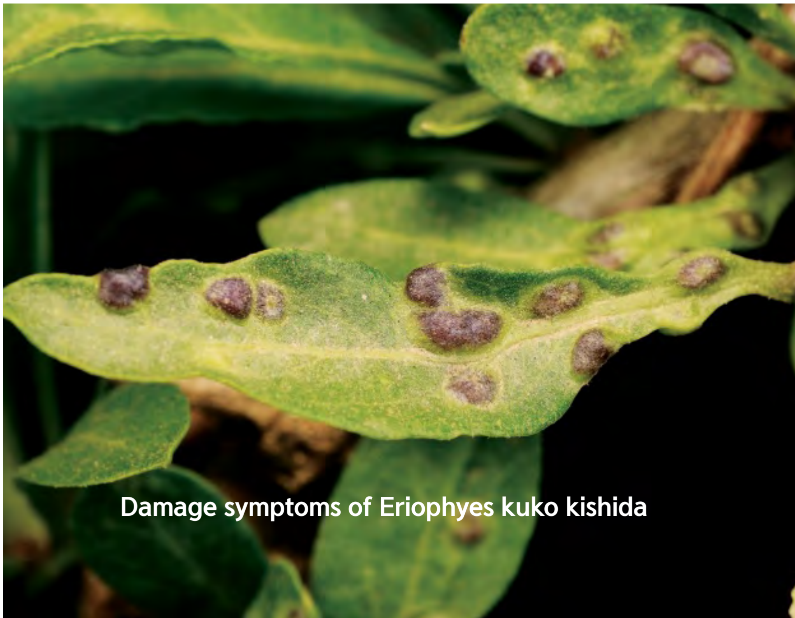
Nymph of Eriophyes kuko kishida and its egg

The back of Enriophyes kuko Kishida


Picture of light yellowish species of an adult Eriophyes kuko




Early stage damage symptoms of Eriophyes kuko kishida


Damage symptoms of Eriophyes kuko kishida

Citrus red mite

Panonychus citri

Life cycle

Its eggs are spherical, 0.13~0.15㎜ in length, and red. The nymph is 0.2mm in size, pink, and has 3 pairs of legs, the protonymph is about 0.3mm, similar to the larva, but it has 4 pairs of legs. The length of the late instar nymphis is 0.3~0.45㎜, which is similar to the early instar nymph.

Female adults are 0.45~0.56㎜ in length, slightly wider than males, and at a glance, they are oval in shape, and the body color is dark red, conical is thick and long setae are on the fleshy protrusions. Male adult insects are 0.3~0.4㎜ in size, smaller than females, and have a rhombus shape, the tail ends are rather sharp and the legs are longer than the body.

Damage

Nymphs and adults insects parasitize on leaves and fruits, absorbing cell fluid or chlorophyll in tissues. Damaged leaves have white spots on the surface of the leaves that look needle-punctured.

Chlorophyll destruction causes decreasing nutrient assimilation on the damaged leaf, which evaporates moisture on the fluid suctioned scar, causing a decline in physiological function. If the damage is severe, the leaves may whiten, leading to prematurely fallen leaves. When fruit is damaged, fine white spots appear on the fruit's surface, resulting in poor coloring.

(National Crop Pest Management System/NCPMS)

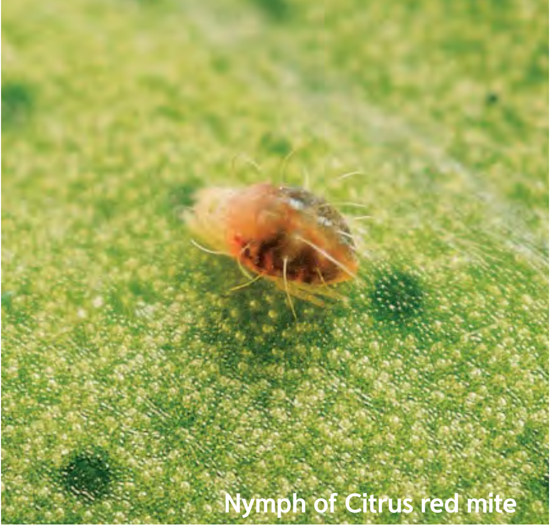
Refer to pages 25, 35~37

JADAM Natural Control Ratio

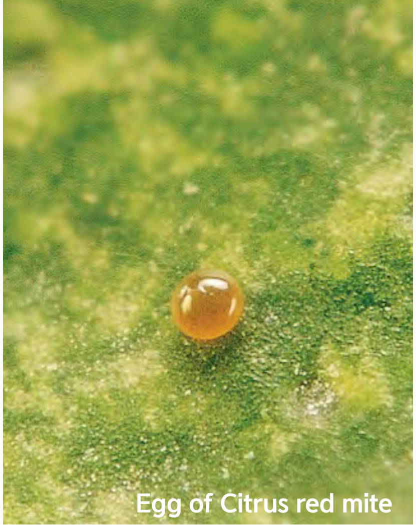
Standard (20L)	Winter Control	Infestation	Emergency
JS	60ml		
JWA	400ml	400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil	80g	40g	60g
Control interval	7days	Visible effect	30minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- For evergreen tree, 60ml of JADAM Sulfur is used for winter control.
- Perennial fruit trees must be controlled in winter.

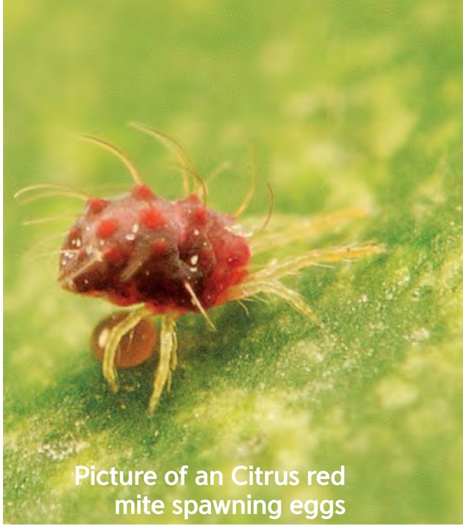
20L= 5.3gal, 15L ≈ 4gal, 100g=3.5oz



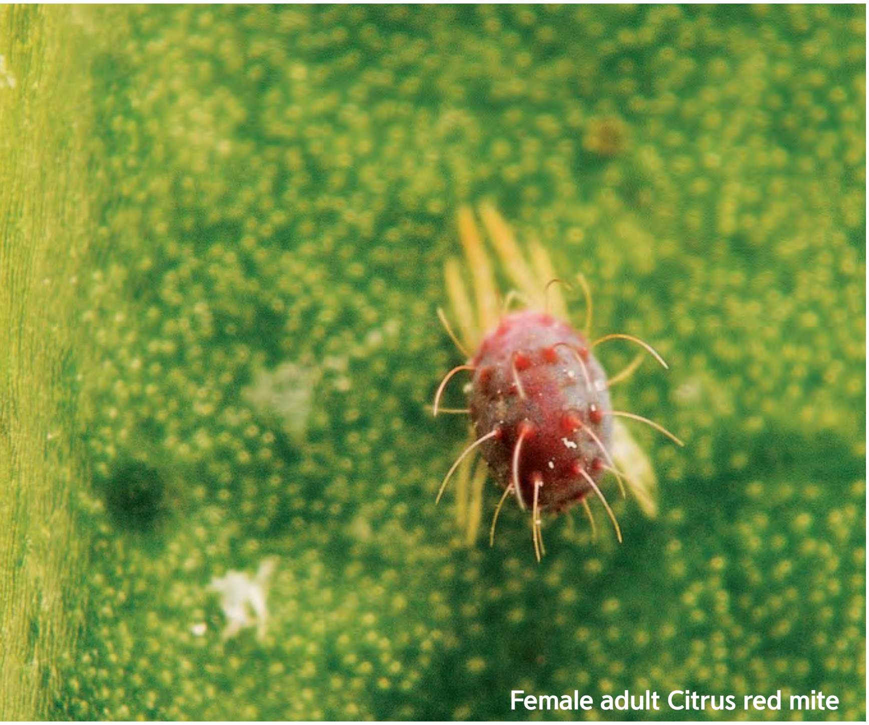
Nymph of Citrus red mite



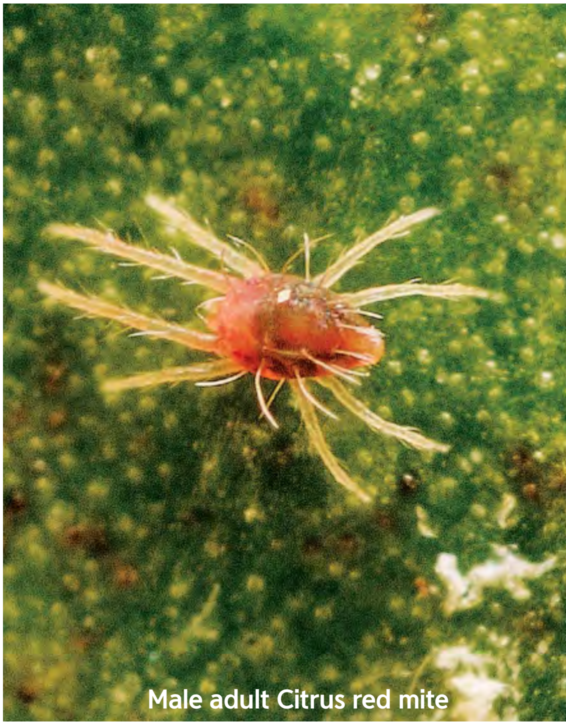
Egg of Citrus red mite



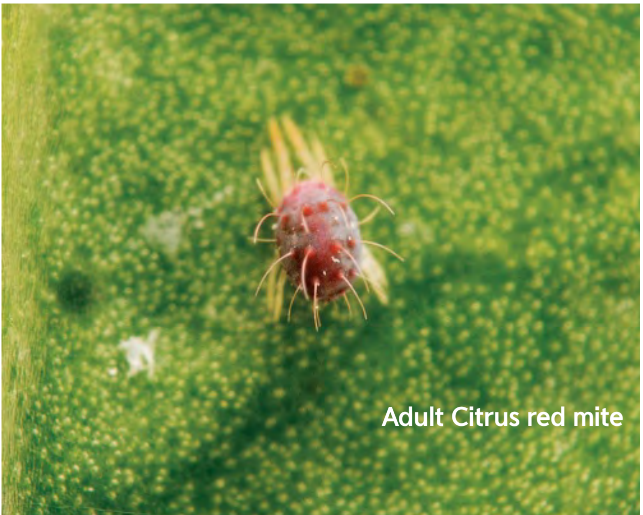
Picture of an Citrus red
mite spawning eggs



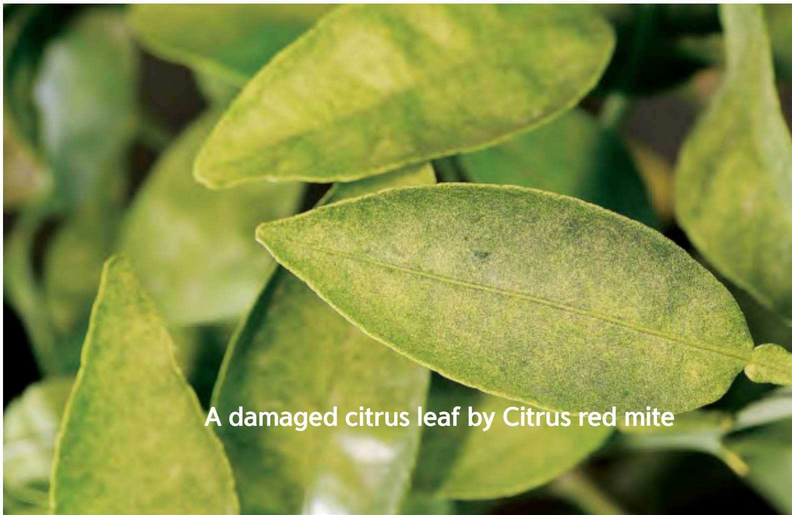
Female adult Citrus red mite



Male adult Citrus red mite



Adult Citrus red mite



A damaged citrus leaf by Citrus red mite

Blue oat mite

Penthaleus major

Life cycle

The size of the blue oat mite is around 1.3mm and approximately 0.7mm to 0.8mm wide, with 8 red-orange legs. They have a blue-black coloured body with a characteristic red mark on their back. The host plant is rice, such as Festuca ovina, weeds, clover, cotton, Chinese cabbage, and spinach. It is widespreaded in Asia and the United States including many other. Blue oat mites are active in cool temperatures and hibernate during the summer in eggs.

Dormant eggs hatch from late October to November, occuring once or twice a year, and often occur from late October to mid-December, and from late February to early May. Damage to domestic crops were reported on Penthaleusery throcephalus species in Jeju and Namhae South Korea in 2011, and they were found in organic spinach fields, citrus and garden weeds.

Damage

In the daytime, they hides on the back of leaves or on the surface of the ground, they infect host plants while active at night.Damaged leaves turn silvery white, and in severe cases they may dry out. In the case of cabbage, they infiltrate the inside to cause damage. (Korea National Arboretum)

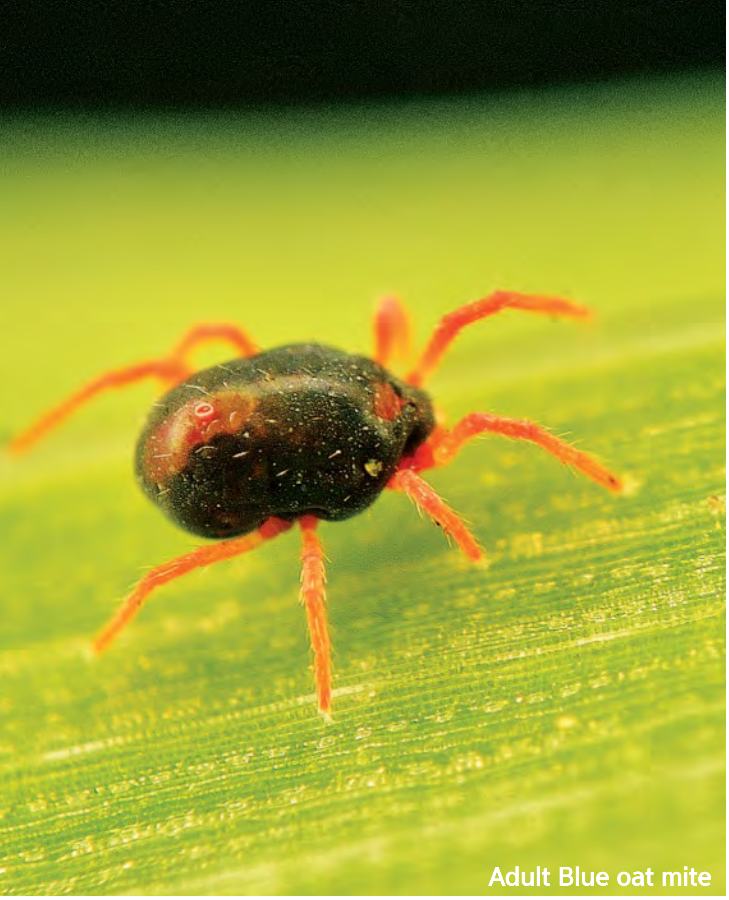
Refer to pages 25, 35~37

JADAM Natural Control Ratio

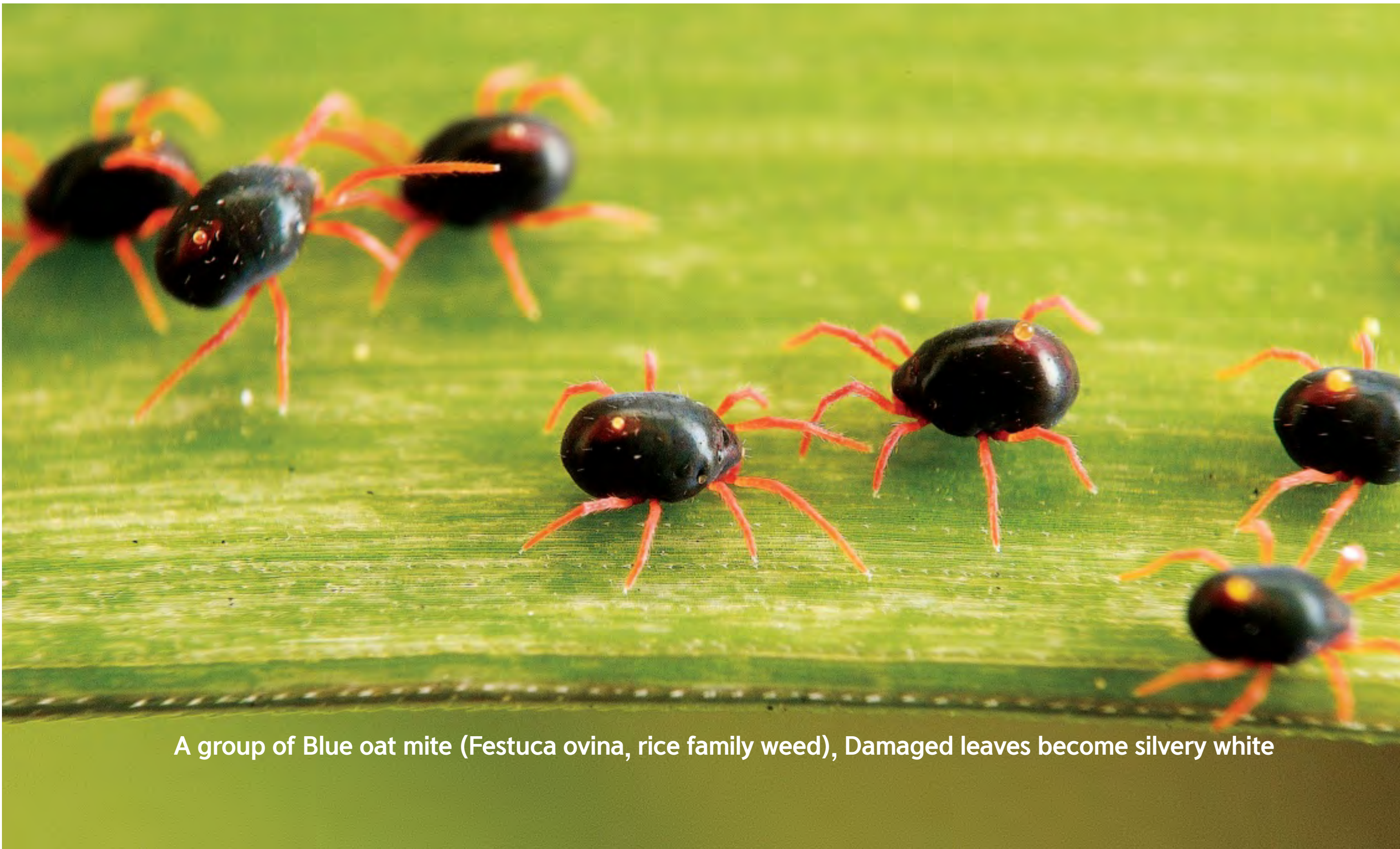
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		600ml	600ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.

20L= 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Blue oat mite



A group of Blue oat mite (Festuca ovina, rice family weed), Damaged leaves become silvery white

Bulb mite

Rhizoglyphus

Life cycle

The size of an adult is 0.7mm, and its body is milky white, and pear shaped. Mouth and legs are brown, egg size is about 0.2mm, milky white, shaped in oval.

They occur dozens of times a year and overwinter as an adults or as nymphs in the affected area or under the ground. Adults spawn about 600 eggs on the bulb's surface, usually reproduce 1 generation every 20 to 30 days. There are many occurrences in acidic sandy soils rich in organic matter, and when the earth's temperature rises in spring, they multiply and reaches the highest density in June-July.

The life of each embryo varies depending on the condition or temperature of the host plant, but the egg stage is 4 to 20 days, the first nymph stage is 1 to 11 days, the second nymph stage is 2 to 11 days, their ideal temperature for development is 20 to 25℃.

Damage

Damage symptoms can be yellow leaves under the stem caused by bulb mite damage, and occurrence can be identified by pulling out the crop to see its root.

They are omnivorous and inflicts various crops such as prickly pear, ginger, and bulbous flowers, since adult insects and nymphs mainly damage the bulbs under the ground, damage symptoms do not appear in the beginning, but the growth of the above part of the plant gradually deteriorates and is the cause of the bulb rot.

(National Crop Pest Management System/NCPMS)

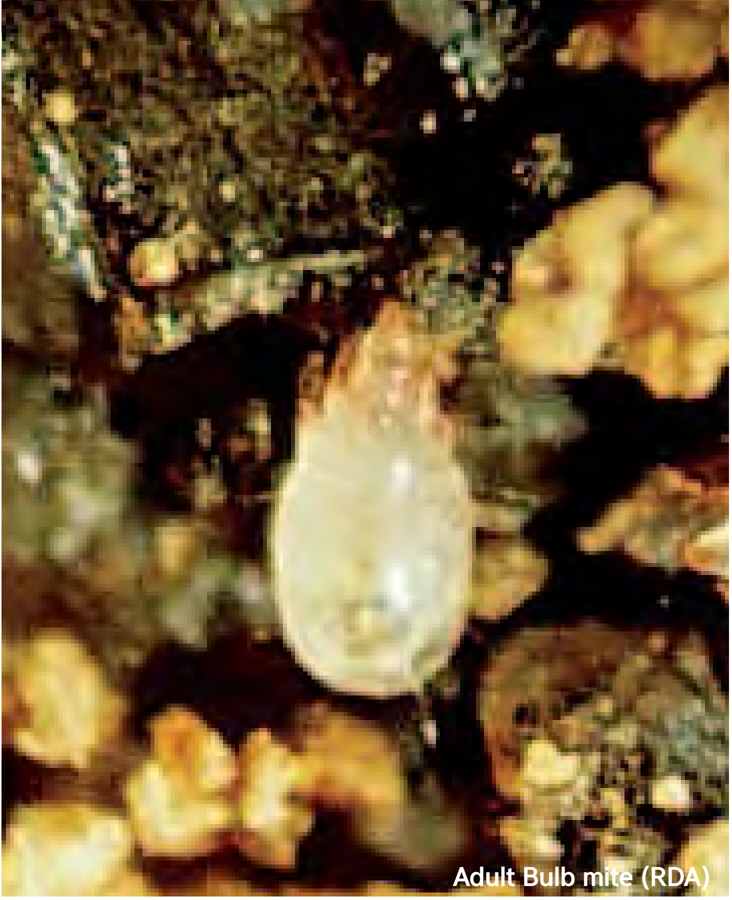
Refer to pages 25, 35~37

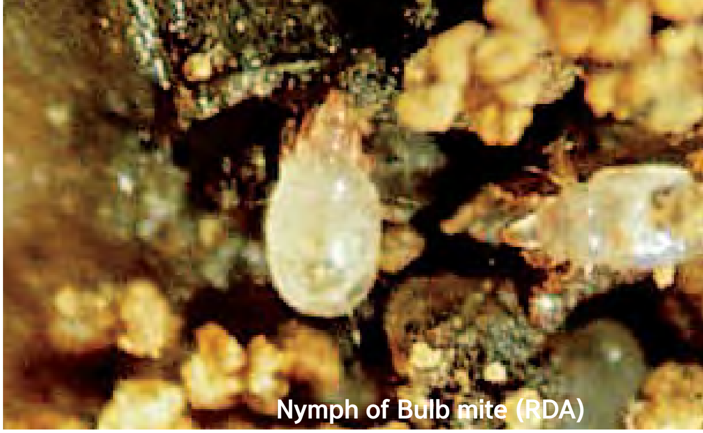
JADAM Natural Control Ratio

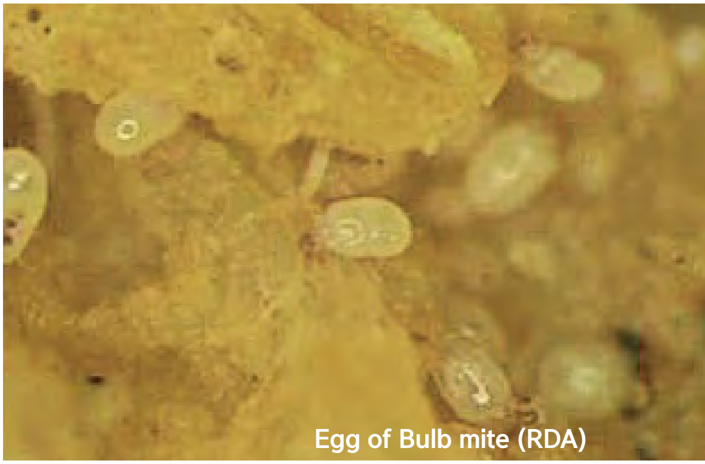
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		600ml	600ml
JMS	2000ml		
NaOH			40g
Fine soil			
Control interval	7days	Visible effect	24 hours

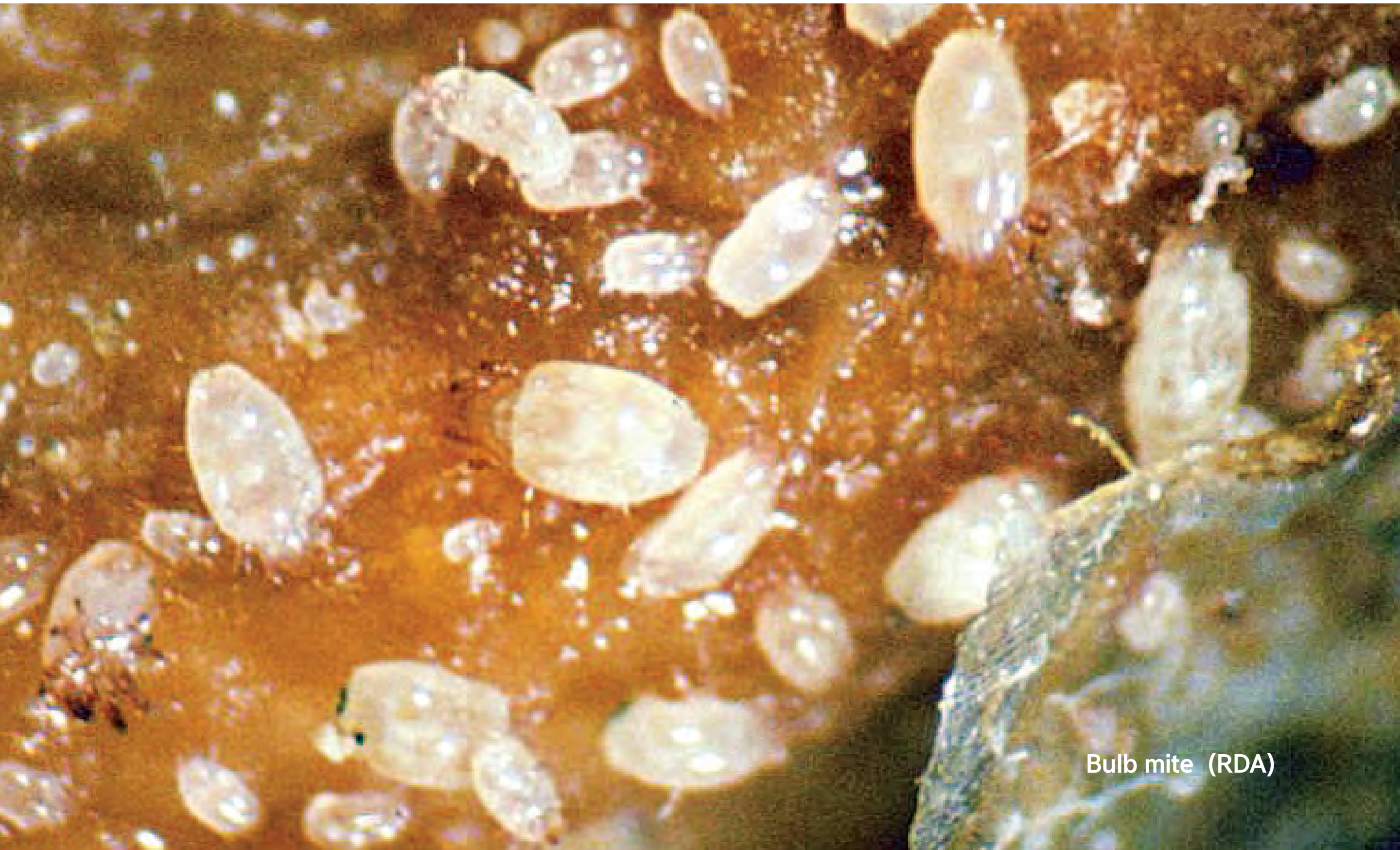
- JADAM solution effectively controls this pest.
- Spray or irrigate JMS enough to wet the root area of the crop. Frequent use of JMS can help avoid damages. As the diversity of microorganisms in the soil increases and the number increases, the damage disappears.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Bulb mite (RDA)


Nymph of Bulb mite (RDA)


Egg of Bulb mite (RDA)


Bulb mite (RDA)

European red mite

Panonychus ulmi

Life cycle

The female adult is about 0.4mm long, has a long body shape, has a dark red body with white spots, has a horizontal line on the back of the body, and the hair on the back is long and thick, and the egg is red, with one sack attached to the end. The male is about 3mm small.

In the egg stage, it winters in between the branch's turnout curve and hatches in late April to early May during the apple tree blooming season. The hatched larvae move to fruit clustered leaves to feed themselves. The larva and nymphs mainly live on the leaf's backside, but when they become adults, they mainly live on the leaf's front side. It becomes an adult from 2-3 weeks after hatching, and the male comes out 1-2 days first, waits near the female in the stationary phase, and then mates immediately when the female finishes molting. The fertilized eggs of the European red mite become female, and the unfertilized eggs become male, and the sex ratio of male to female is approximately 75:25.

The female begins to lay eggs 2-3 days after becoming an adult and spawns an average of 30-35 eggs on both sides of the leaf, especially near the leaf veins, and the lifespan is about 15-20 days. They can have 7 to 8 generation a year.

When the population increases beyond capacity for one plant, it moves to the tip of a young branch or leaf, lifts it's upper body, and produces a thread from the rectum to travel it to other trees nearby on the wind.

Damage

From front and back of a leaf, it sucks the contents such as chlorophyll by poking bulbous needle into the cell. You can fine white spots on the damaged parts. Damaged leaves turn into brown, and photosynthesis and transpiration activities decrease. In severe cases, leaves fall early after August.

(National Crop Pest Management System/NCPMS)

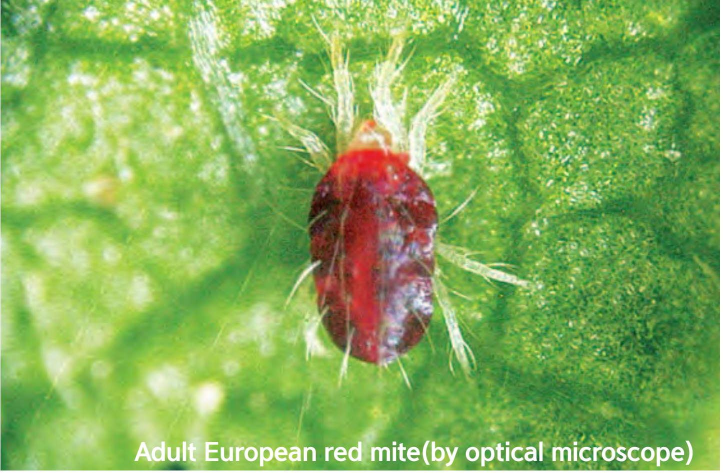
Refer to pages 25, 35~37

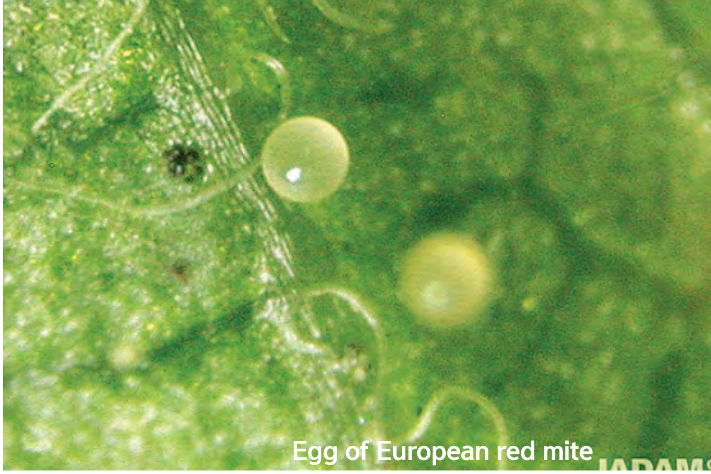
JADAM Natural Control Ratio

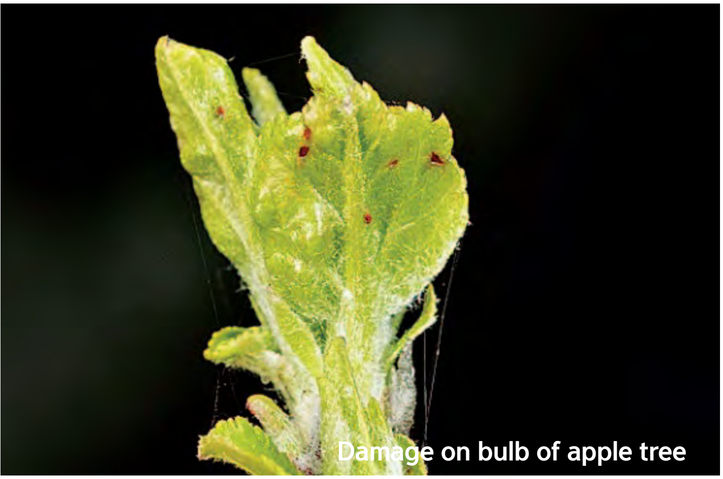
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	400ml	600ml
JHS		600ml	600ml
JMS			
NaOH			40g
Fine soil	80g		40g
Control interval	7days	**Visible effect**	30minutes

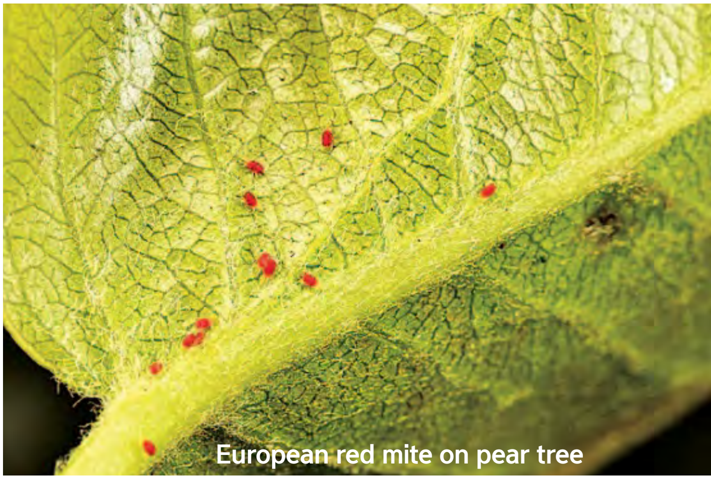
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

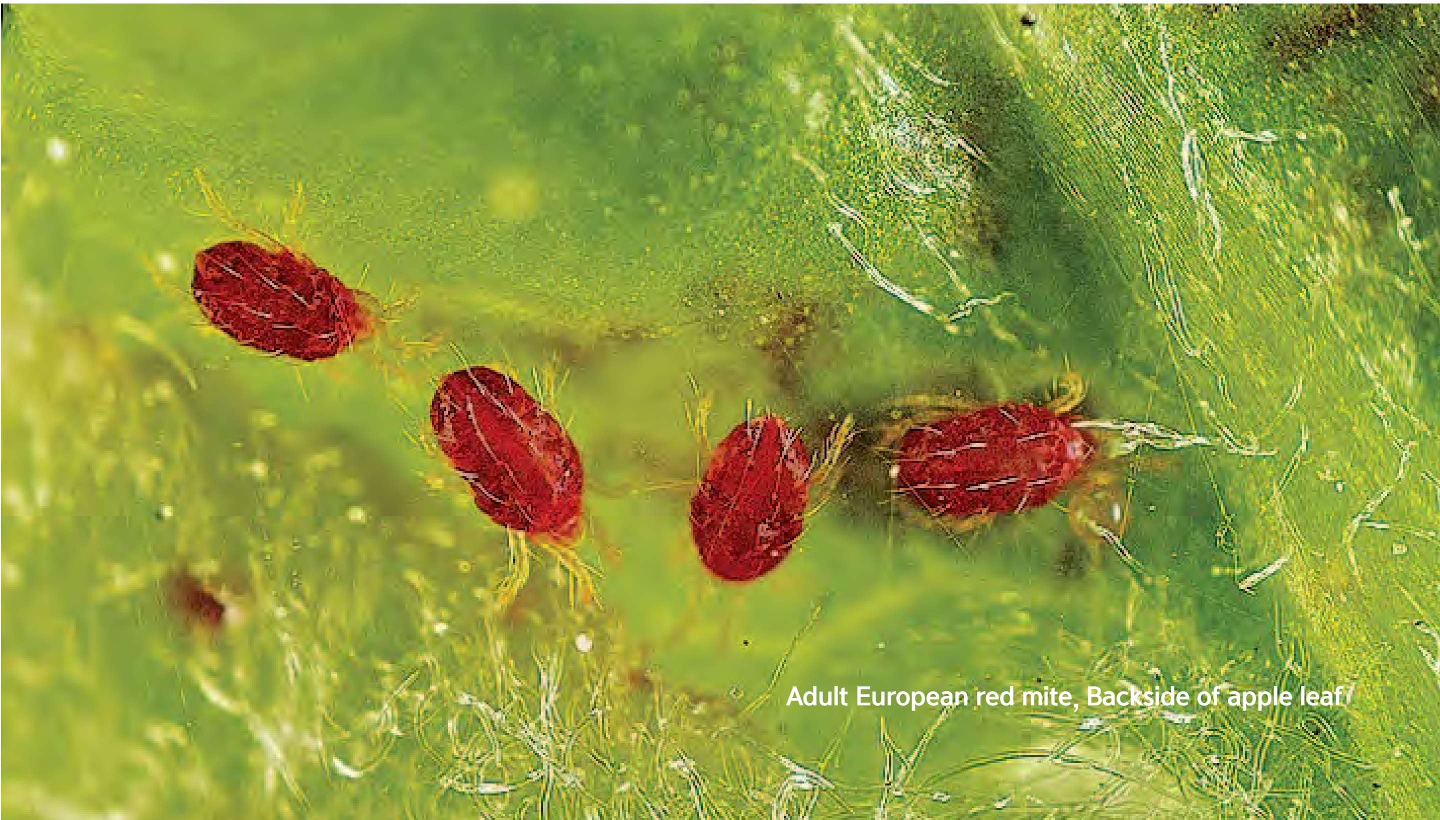
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult European red mite(by optical microscope)


Egg of European red mite


Damage on bulb of apple tree


European red mite on pear tree


Adult European red mite, Backside of apple leaf

Brown mite

Bryobia rubrioculus

Description

The body length is about 0.75mm, and its primary host plants are green onion, garlic, Canadian horseweed, Japanese cornelian cherry, and apple. It lives in Korea, Japan, and the United States, including many other countries.

Life cycle

It has a very similar appearance to Bryobia praetiosa but a little bit smaller in size. Although it occurs once in early spring or autumn, This particular pest is known to require comparably less control than others. It occurs once or several times a year. In summer, eggs are in a deep sleep, but they winter as adults or nymphs in warm regions.

(National Crop Pest Management System/NCPMS)

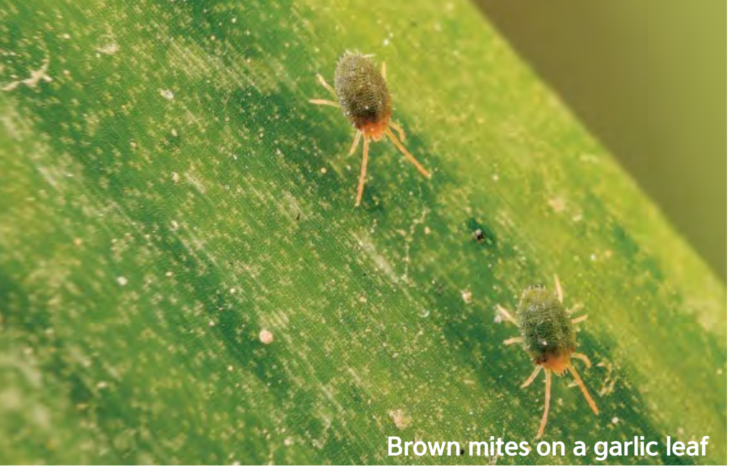
Refer to pages 25, 35~37

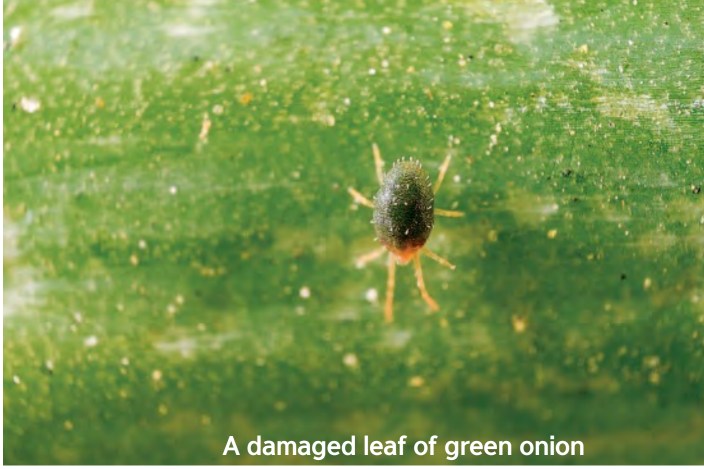
JADAM Natural Control Ratio

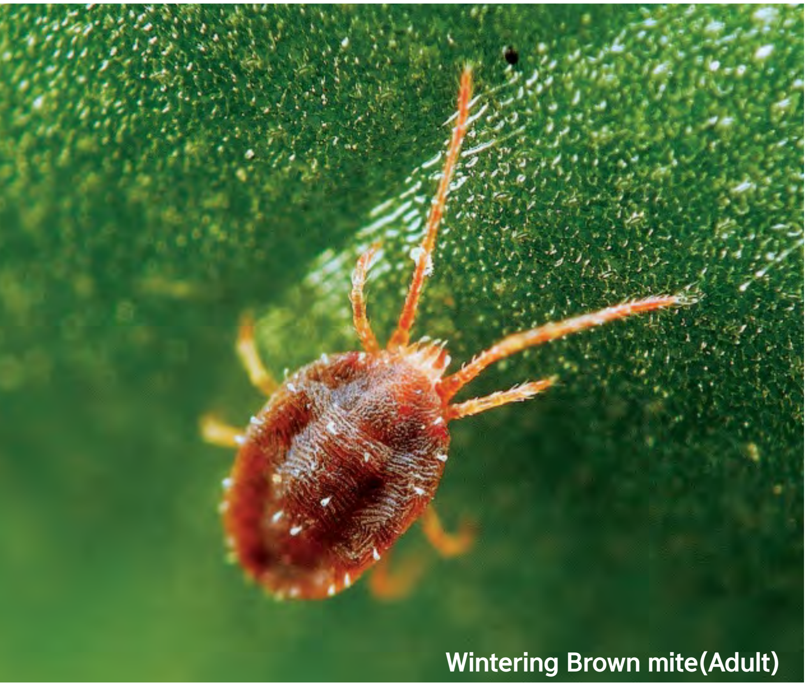
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		600ml	600ml
JMS			
NaOH			
Fine soil			
Control interval	10days	Visible effect	30 minutes

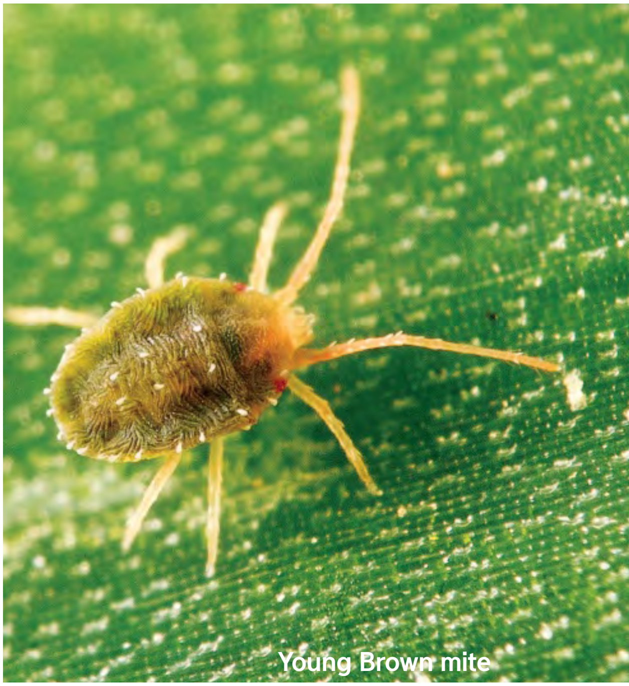
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Brown mites on a garlic leaf


A damaged leaf of green onion


Wintering Brown mite(Adult)


Young Brown mite

Twospotted spider mite

Tetranychus urticae

Description

Female adult insects have a body length of 0.4~0.5mm, and the summer type has distinct black dots on the left and right sides of the body on a pale yellow-green background, but the winter type is orange and has no black dots on the back. The male adult insect is about 0.3mm; the body is light brown, thin, the abdomen's tip is sharp, with extended legs. The egg is transparent, ball-shaped, and the diameter r is 0.14mm. There are three types of nymphs (larvae, first nymph, and second nymph).

The larva is slightly larger than the egg and is transparent at first, but gradually turns light green, and black spots are formed, the eyes are red, and there are 3 pairs of legs.

The first and second nymphs have larger bodies than than larvae and black spots, dark green, and 4 pairs of legs like an adult. There are 3 stop periods in the middle of each stage of development, and when the stop period is over, it sheds each time.

Life cycle

It often occurs in greenhouses or facilitated farms with high temperatures the two spotted spider mite occurs 9 times a year in cold regions and 10 to 11 times in warm regions and winters as an adults. Inside the greenhouse, it does not sleep if it is warmed and illuminated at night. Wintering adult insects breed in weeds first and then move to the crops as the crops grow, and August is the peak season for this mite.

Their primary habitat is the leaf's back surface but damages both the crop's leaves front and back. The beginning temperature of growth development is around 9℃, the appropriate temperature for growth development is 20~28℃, and the optimal humidity is 50~80%, and it takes 10 days from eggs to adults at 25℃. In an optimal environment, the number of mites will increase rapidly.

(National Crop Pest Management System/NCPMS)

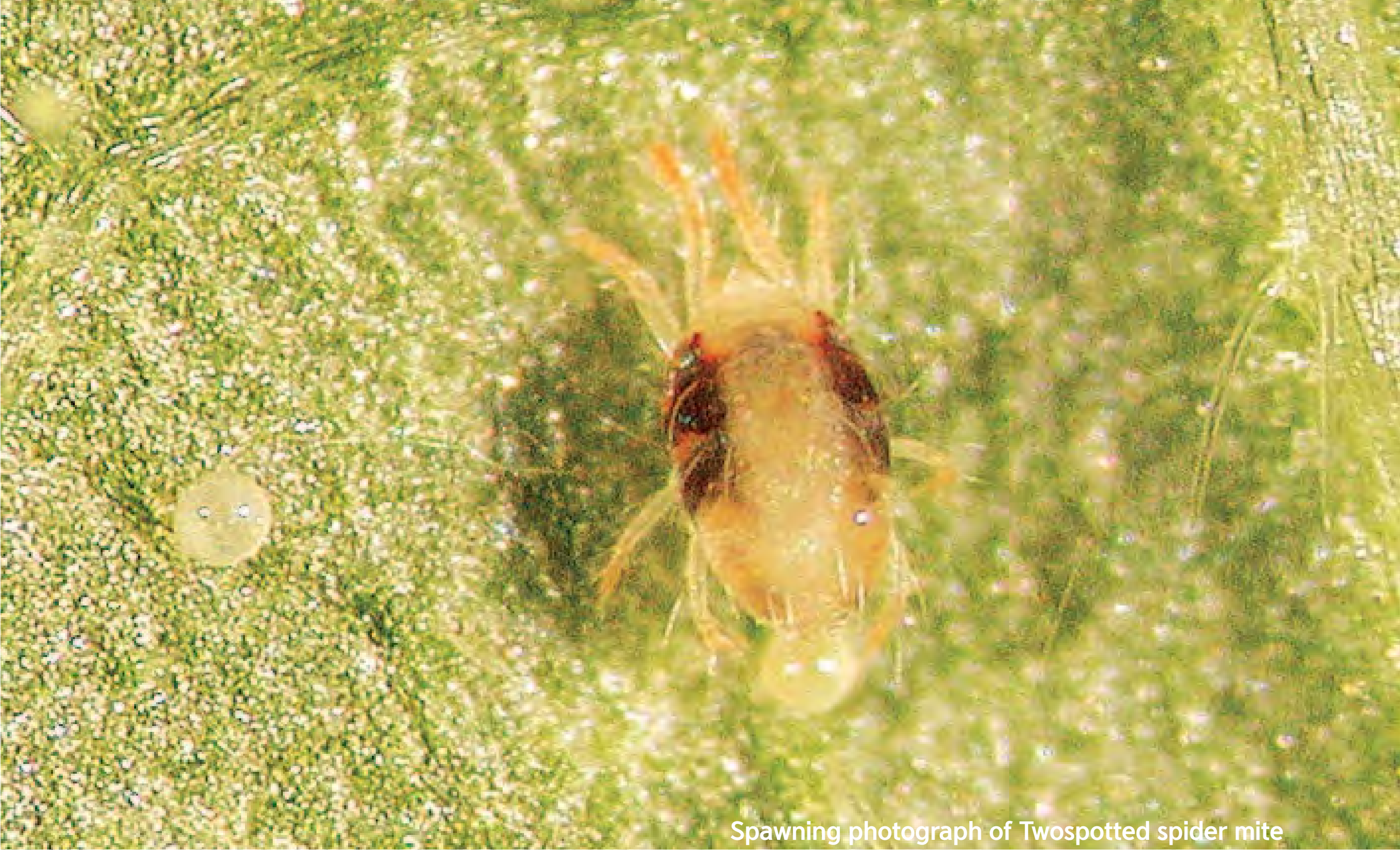
Refer to pages 25, 35~37

JADAM Natural Control Ratio

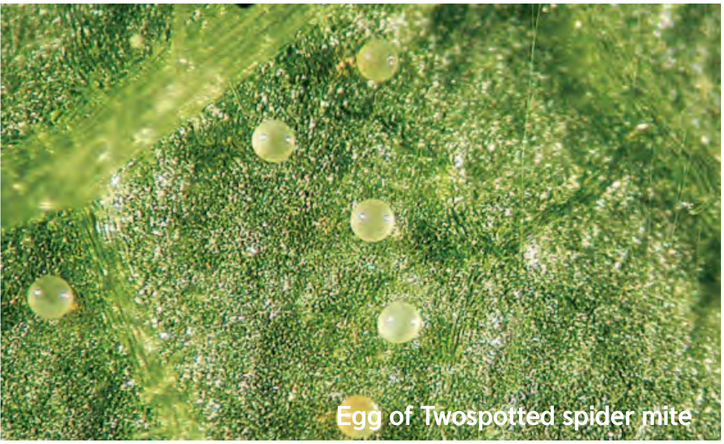
Standard (20L)	Prevention	Occurrence Time	Emergency
JS			
JWA		400ml	600ml
JHS		600ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Since the mite is too small to identify the initial occurrence, you periodically control it at the expected time of occurrence.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.

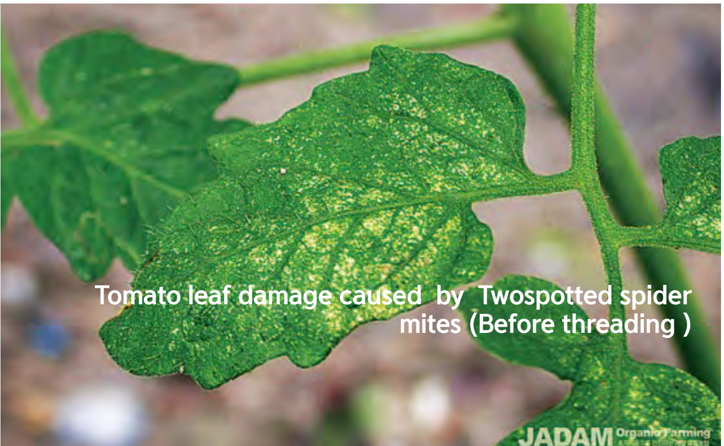
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Spawning photograph of Twospotted spider mite

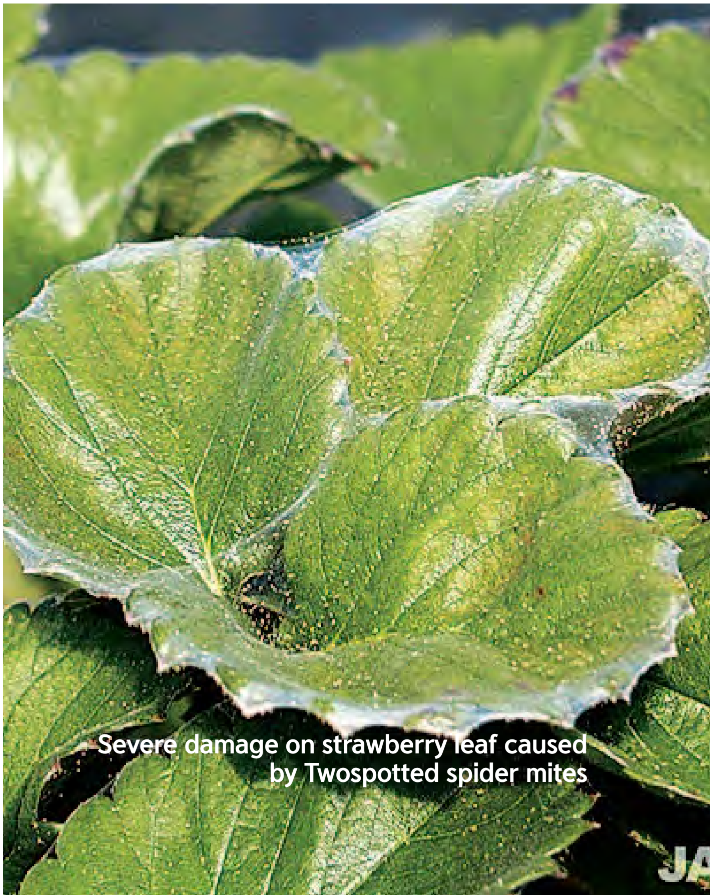


Egg of Twospotted spider mite



Tomato leaf damage caused by Twospotted spider mites (Before threading)

JADAM Organic Farming



Severe damage on strawberry leaf caused by Twospotted spider mites

Tea red spider mite

Oligonychus coffeae

Description

The length of tea red spider mite's egg is about 0.13mm in a round and transparent, the larva has 3 pairs of legs, the body color is yellow-green and has black dots on both sides of the body. The protonymph has 4 pairs of legs, and the color of the body is the same as the larva.The late instar nymph's body color and the adult nymph are dark red or bright red, and the male adult nymph has a yellow or red body color. The body's size at each stage of development is about 0.2mm for larvae, about 0.3mm for nymphs, and 0.4 to 0.5mm for adult females.

Life cycle

The primary host plants include peaches, tea, legumes (clover, rake, etc.), gourd plants, and it occurs in dry places where rainfall is low, and where there are many young plant shoots. The proper temperature for development is 17~28℃, the growth rate and spawning number decreases under extremely high temperature or humidity conditions. The egg period under the right temperature is 5-10 days, and the larvae-adult period is 5-10 days. One adult female spawns about 100 eggs during its lifetime and occurs several times a year. In warm regions, all stage of development can be found, and in regions with low temperatures, they overwinter by parasitizing from beneath a fallen leaves or in the rough bark of trees in autumn.

Damage

It occurs mainly in the new leaves in spring and summer. Citrus red mites act more individually, but Tea red spider mites form a group to persecute the host plant, but they rarely inflict fruit, they prefer newly-grown leaves. When a new leaf is damaged, the surface of the damaged leaf becomes faded and yellowed, and the affected area growth is hindered, causing the leaf to become deformed, and if the density is high, the entire leaf becomes yellow, and in a worst-case, the leaf falls apart. However, the degree of damage isn't deep.

(National Crop Pest Management System/NCPMS)

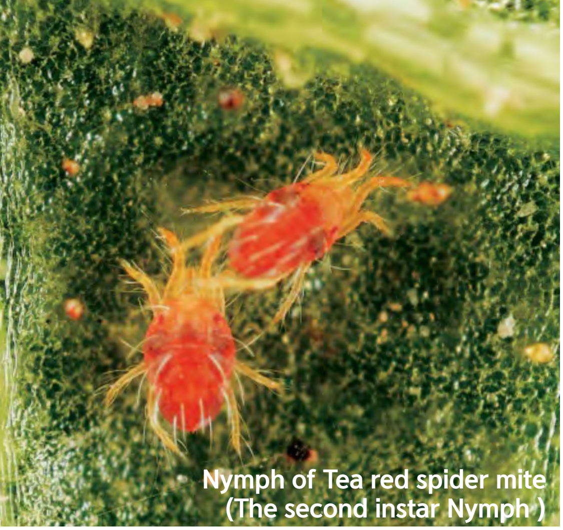
Refer to pages 25, 35~37

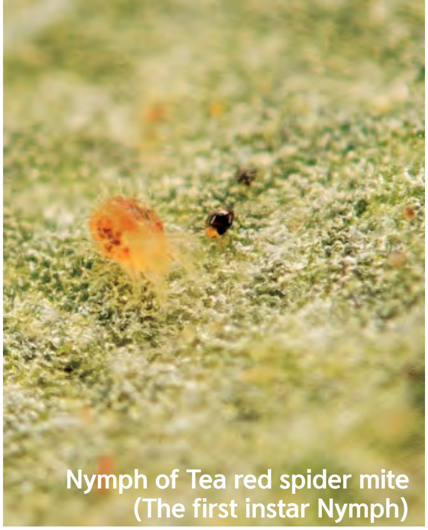
JADAM Natural Control Ratio

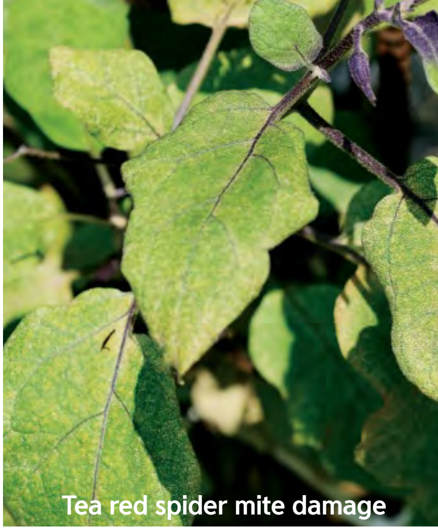
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	80ml		
JWA	400ml	400ml	600ml
JHS		600ml	600ml
JMS			
NaOH			40g
Fine soil	80g		40g
Control interval	7days	Visible effect	30minutes

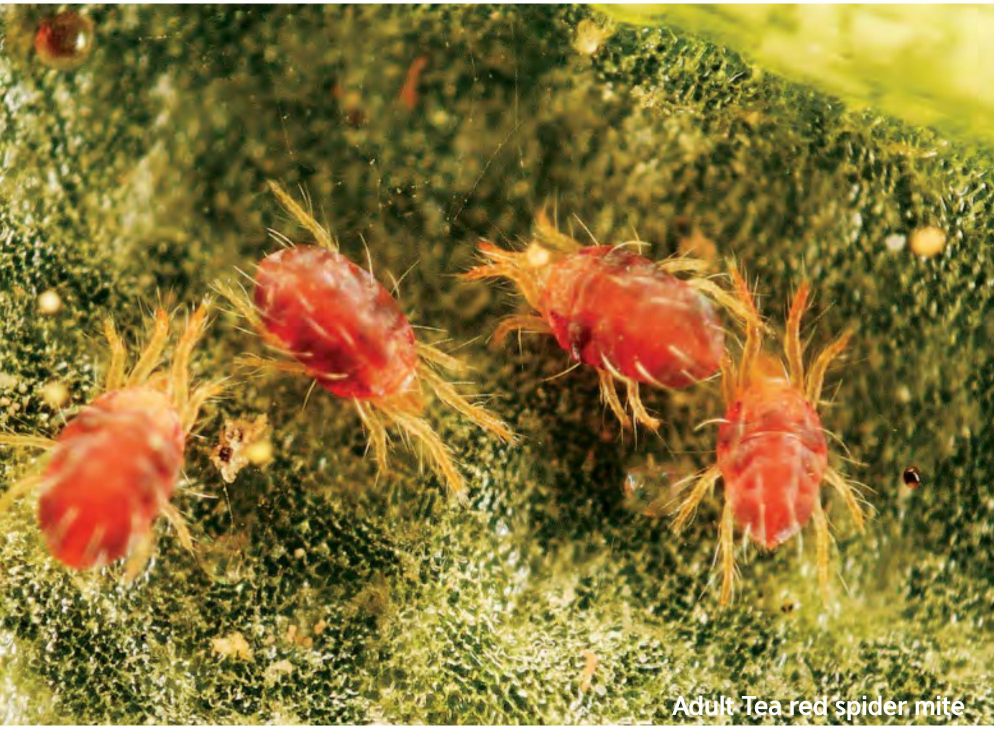
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Since the mite is too small to identify the initial occurrence, you periodically control it at the expected time of occurrence.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.

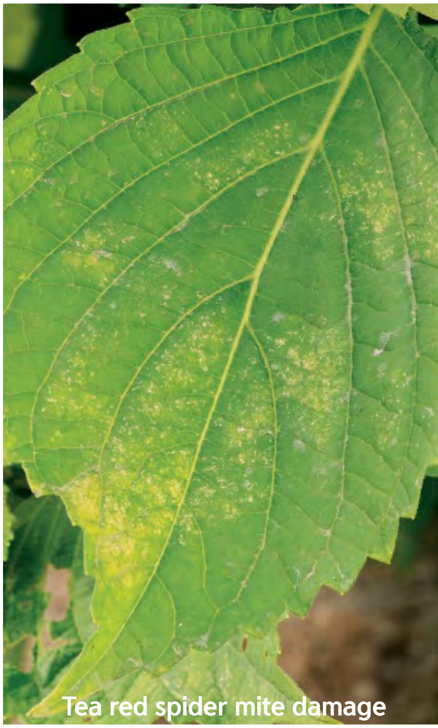
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

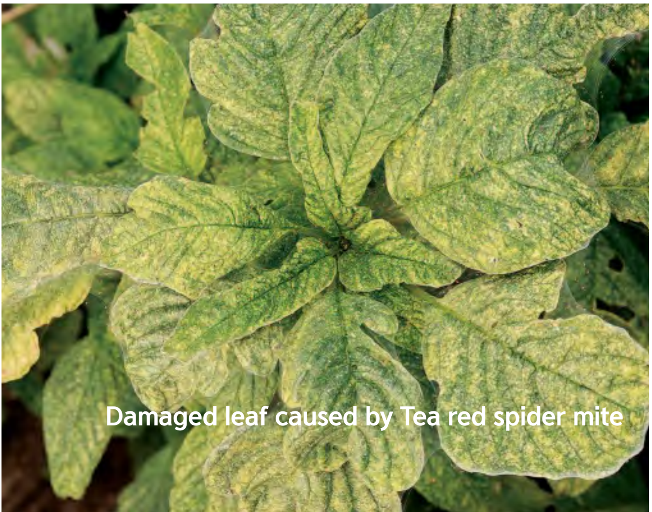

Nymph of Tea red spider mite
(The second instar Nymph)

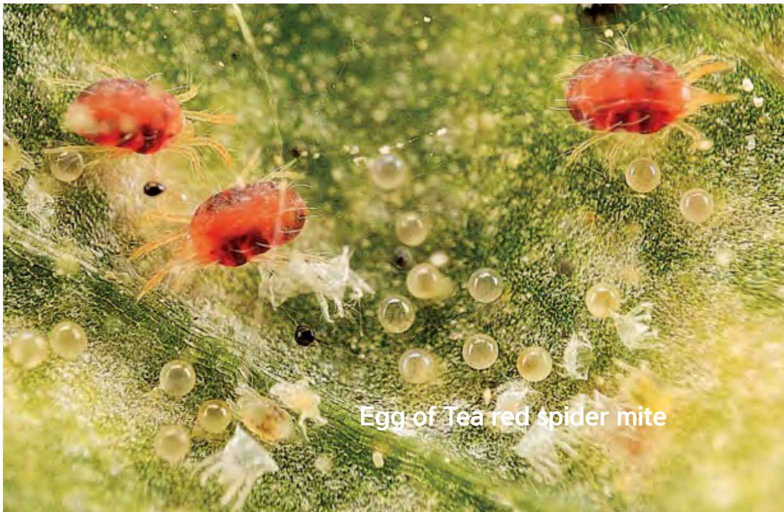

Nymph of Tea red spider mite
(The first instar Nymph)


Tea red spider mite damage


Adult Tea red spider mite


Tea red spider mite damage


Damaged leaf caused by Tea red spider mite


Egg of Tea red spider mite

Aphid

It is small, with a body length of 2 to 4mm, and the body's color is varied. It lives by gathering on the stems, buds, and leaves of vegetation and sucks plants' fluid, so most of them are classified as pests. The body is fragile and characterized by cornicle on both sides between the fifth and sixth abdominal scutellum segments.They have various cornicle shapes such as a cylinder, a ladder, a ring, and some do not have a cornicles. It has 8 Abdominal somites, and the ninth pronotum change to the tail.

It overwinters as an egg, and it becomes a stem mother when it hatches in late March to early April. A stem mother is a female apterous, and when it grows up, it does not lay eggs but gives birth alone. When the offspring grow, they become wingless females that are the same as their mother.As it reproduces several generations repeatedly, the branches of the host plant will be covered with aphids. During this period, winged females (winged larvae) gradually form and disperse.

There are peach aphids and cotton aphids that repeatedly spawn several generations from the winter host plant to the summer host plant depending on the species. Some disperse into the same host plant, such as pine and chestnut aphids. In addition, aphids use the sticky liquid secreted from the cornicle as a weapon to defend the body from enemies. The liquid is used to confine the predator's mouth to avoid any harm, or secreting a lot of wax powder to protect the body.

The main constituent of plants is carbohydrates, and due to excessive intake of plant fluid, which is the staple food of aphids, there is an excess of high sugar in the body, and the excess sugar is discharged as excrement. This results in Tiny ants, parasitic bees, and flies gather to eat this excrement. Also, soot germs are generated in the excrement (nectar) that has fallen on the leaves, causing the leaves to become black and destroy chlorophyll, resulting in insufficient photosynthesis, resulting in poor product value.   (Doosan Encyclopedia)

Chrysanthemum aphid

Macrosiphoniella sanborni

Description

An apterous (wingless) female adult is 2.5~3mm, reddish-brown or blackish brown, and alate (winged) female adult has a dark reddish-brown color. The legs and horns are dark brown, the head and mouth are black, and the eyes are black red. There is a forehead on the head, and the upper part is smooth but has sharp, long setae.The antennae length is the same as the body's length, and the body has long hairs.

Life cycle

It overwinters as an egg or wingless female, then begins to multiply from the beginning of March. From around April, the density increases rapidly and lives in the new sprout area, and temporarily decreases in summer, but increases again from the end of August, and frequently occurs in mid-late September.

For inspection, yellow sticky traps are installed on the top of plants at intervals of 5 to 10m, or accompanying yellow traps are installed near the pavement to investigate adult insects with flying wings. Inspect new shoots whether or not aphids occur.

They occur mainly in spring and autumn, and spring; they parasitize on new branches, leaves, and stems and inflicts suction, so the growth of new leaves becomes unstable, and the growth of stem stops. In autumn, they live mainly on flower stalks and buds.

(National Crop Pest Management System/NCPMS)

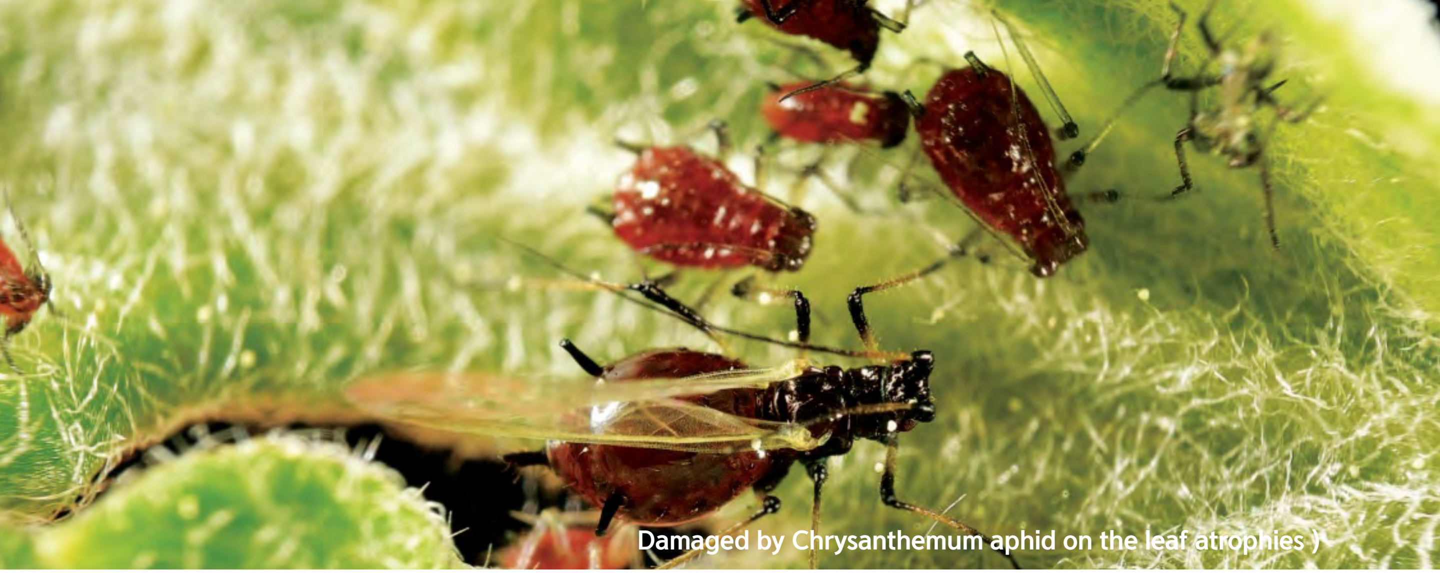
Refer to pages 25, 35~37

JADAM Natural Control Ratio

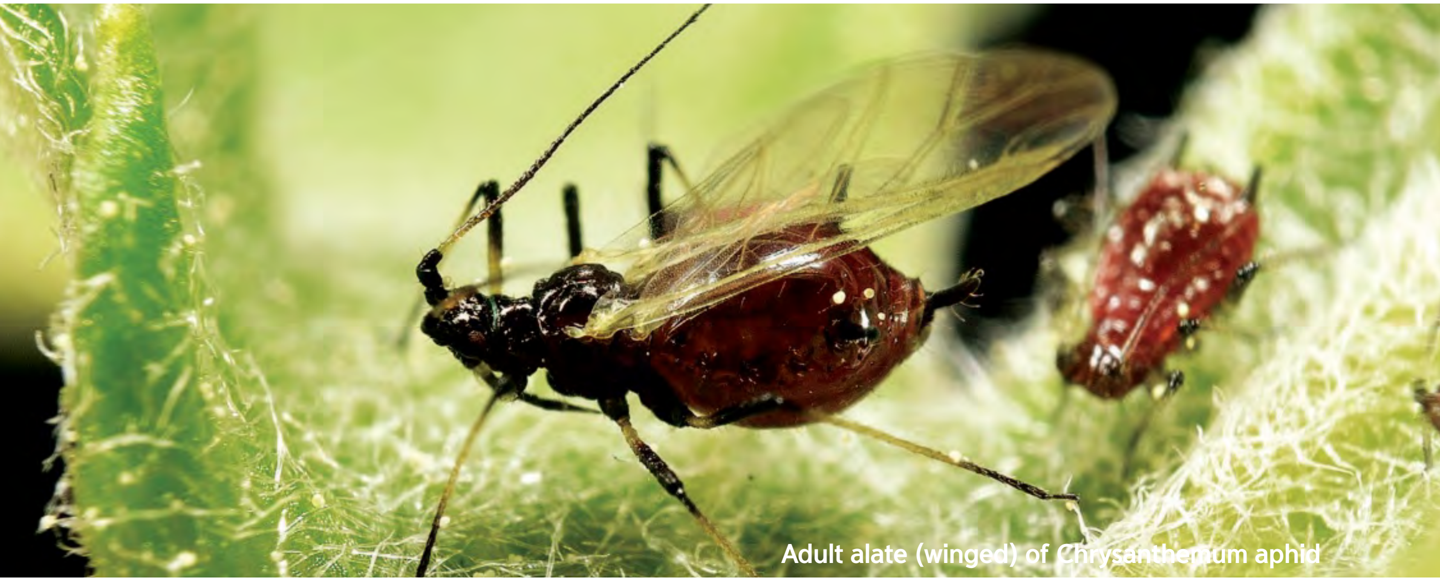
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

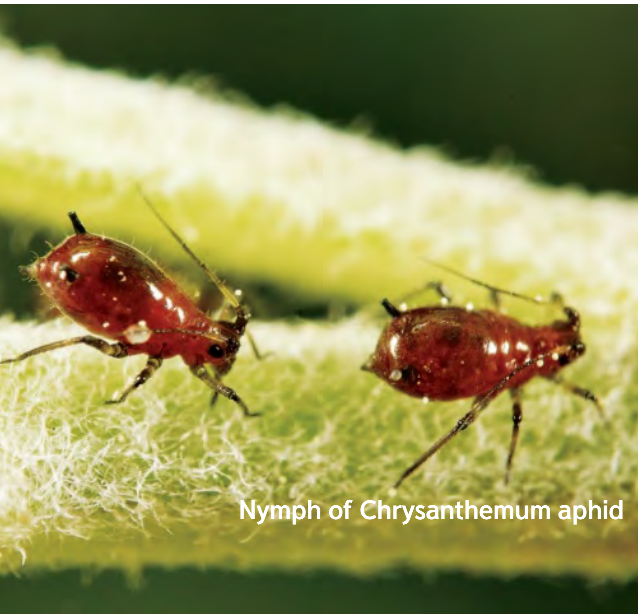
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



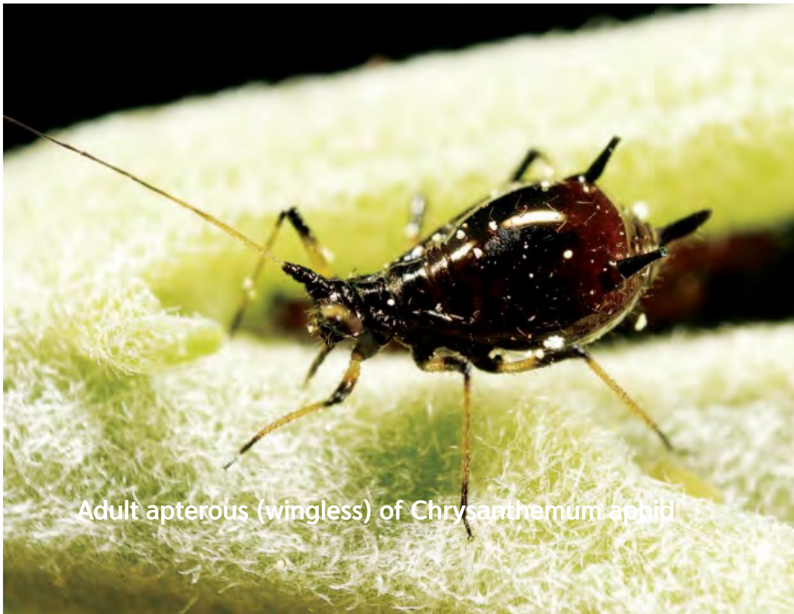
Damaged by Chrysanthemum aphid on the leaf atrophies)



Adult alate (winged) of Chrysanthemum aphid



Nymph of Chrysanthemum aphid



Adult apterous (wingless) of Chrysanthemum aphid

Grain aphid

Sitobion avenae

Description

Adults of aphids are divided into alate (winged) and apterous (wingless), alate appears in a densely populated area or changes their location to find more food. The wingless female is fusiform with a length of about 2.3mm, the head is black, and the thorax and abdomen are dark green. The cornicle is cylindrical, the edge of the tip is expanded, and there is a honeycomb-shaped net pattern. The corncle is about 2.5 times larger then width of bottom surface of aphid.

The antenna is divided into 6 segments, which is shorter than half length of the body. The tip becomes thinner toward the tip, with 4-6 hairs.the winged female is turquoise and the thorax is black The length of the antennae (tactile sensory)is about 2/3 of the length of the body.

Life cycle

It occurs a lot in gramineous crops such as corn, sorghum, millet, and etc. It overwinters primarily in plants of the genus Prunus and migrates to the secondary host such as rice crops near the end of May. It usually winters with eggs, but they can also overwinter as a female adult or nymph in warm places.

The growth period of nymphs is 15~19 at 21℃. After peaking in June, the density sharply decreases from the end of June to the beginning of July. In moist soils or the densely cultivated field, the occurrence amount of Grain aphids is large, and there are differences in the amount of occurrences among varieties, especially on white waxy sorghum.

Damage

Grain aphids damage the back of leaves or stems by suctioning plant fluid. It frequently occurs on leaves or stems on sorghum, but when the density is high, it occurs on spike grass and suctions the fluid and inhibits growth or causes the death of sorghum.
In addition, excreting nectar makes leaves darker, inhibiting photosynthesis, causing fungal diseases, and mediating various viruses.
(National Crop Pest Management System/NCPMS)

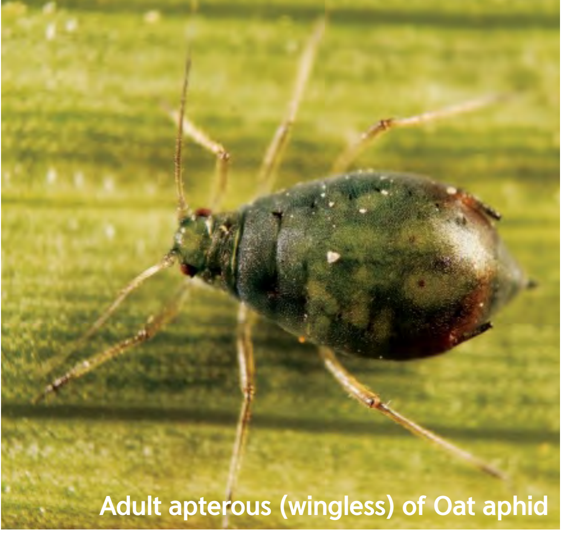
Refer to pages 25, 35~37

JADAM Natural Control Ratio

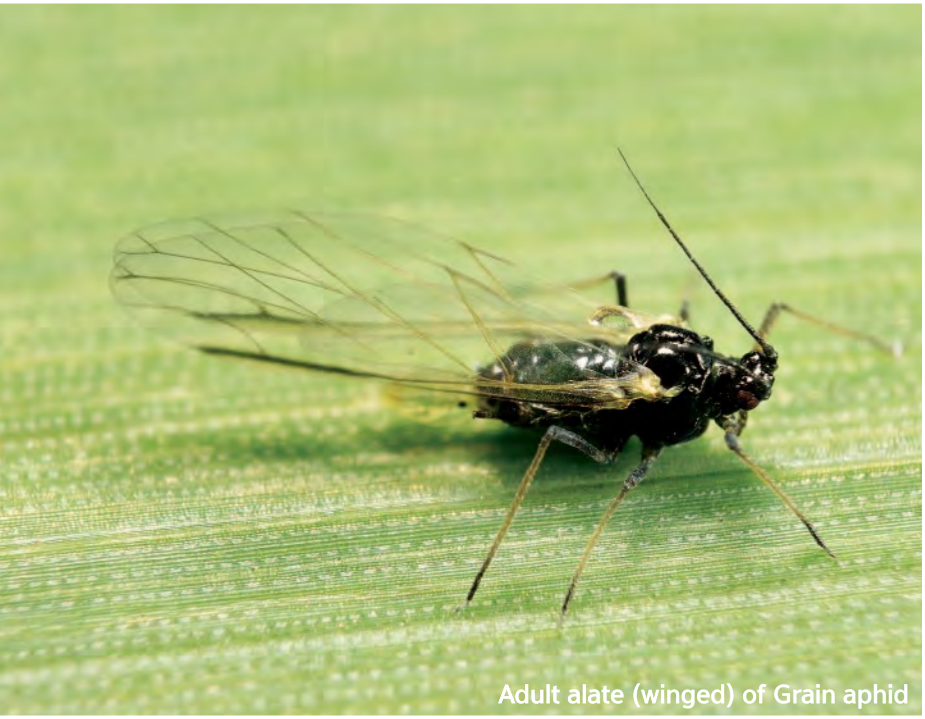
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

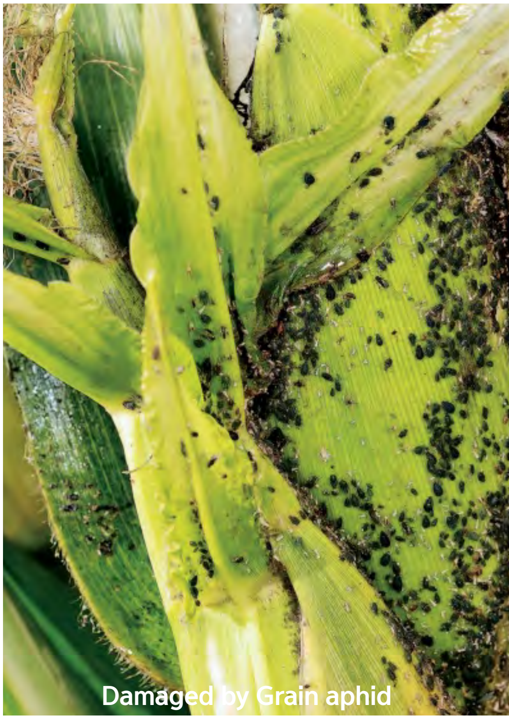
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



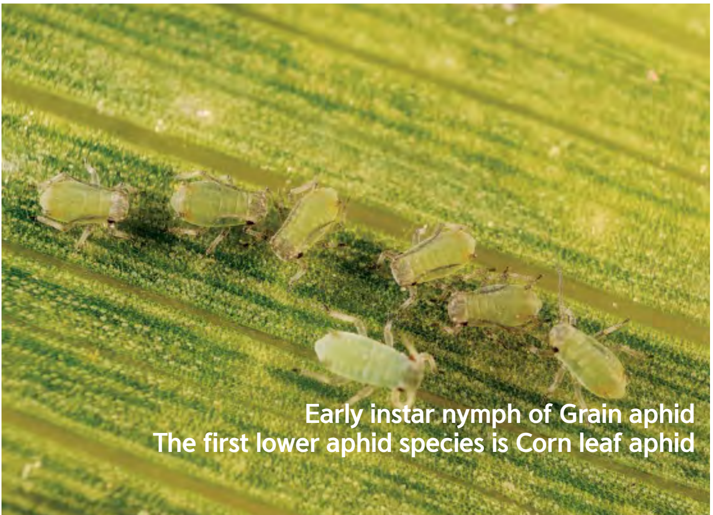
Adult apterous (wingless) of Oat aphid



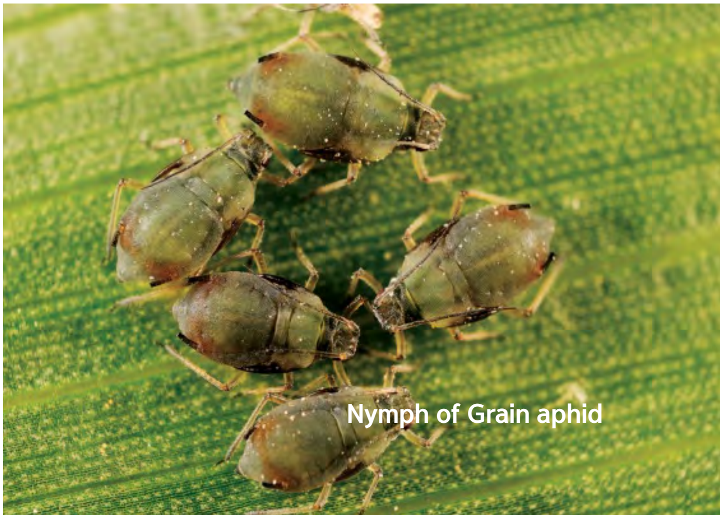
Adult alate (winged) of Grain aphid



Damaged by Grain aphid



Early instar nymph of Grain aphid
The first lower aphid species is Corn leaf aphid



Nymph of Grain aphid

Vetch aphid

Megoura viciae

Description

The body length is about 2.9~3.5mm, and its primary host plant is common vetch, bird vetch, bee peas, Abelia tyaihyoni Nakai trees, and many others. It is distributed in Korea, Japan, and Russia.
In the case of a wingless female adult, the body is dark green, and the antennae, legs, and the tip of the cornicle are dark black. It is a relatively large aphid, with a convex cornicle and a very long end.
(Korea National Arboretum)

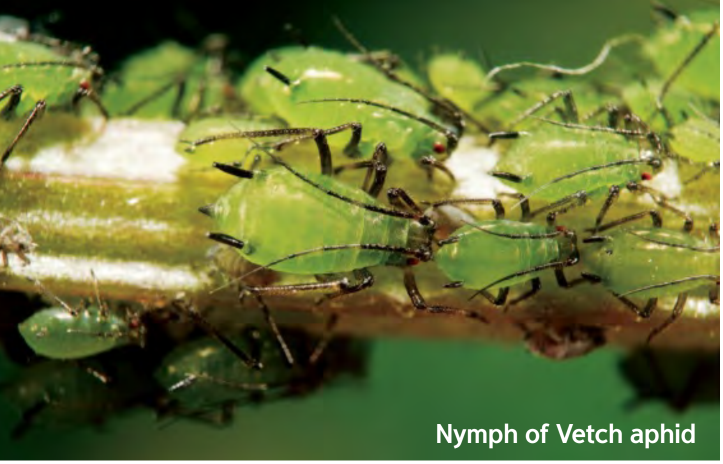
Refer to pages 25, 35~37

JADAM Natural Control Ratio

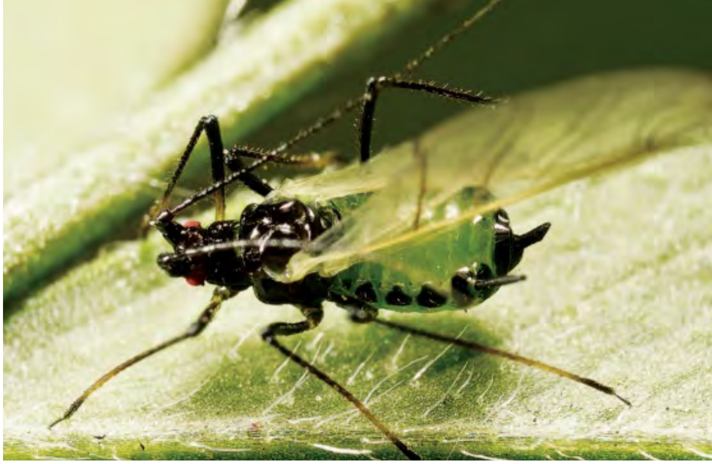
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

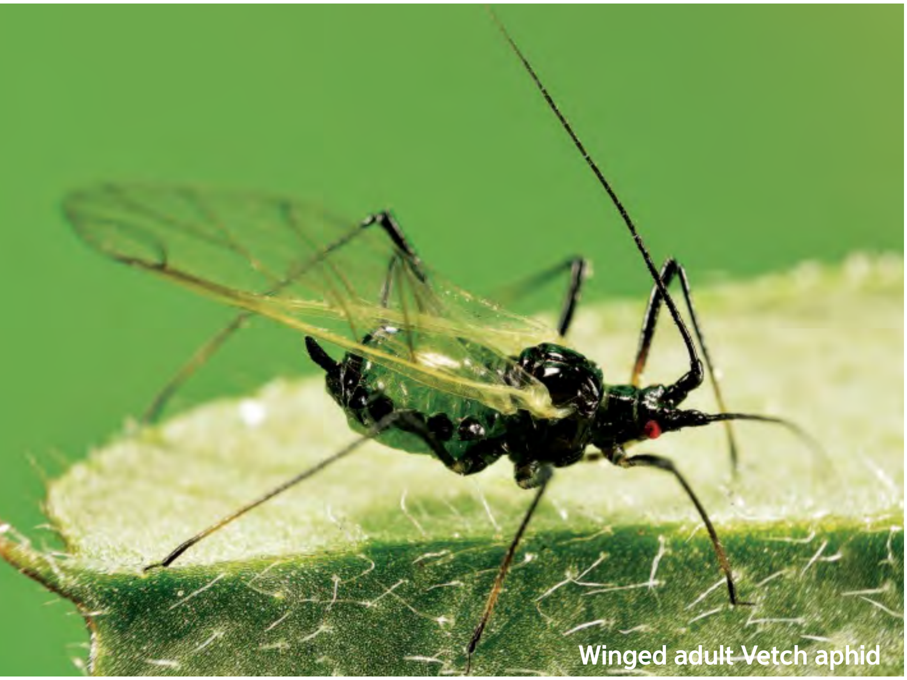
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

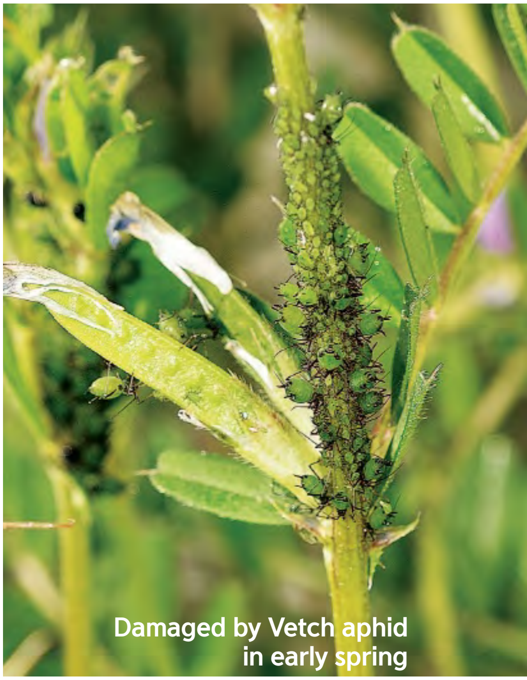


Nymph of Vetch aphid

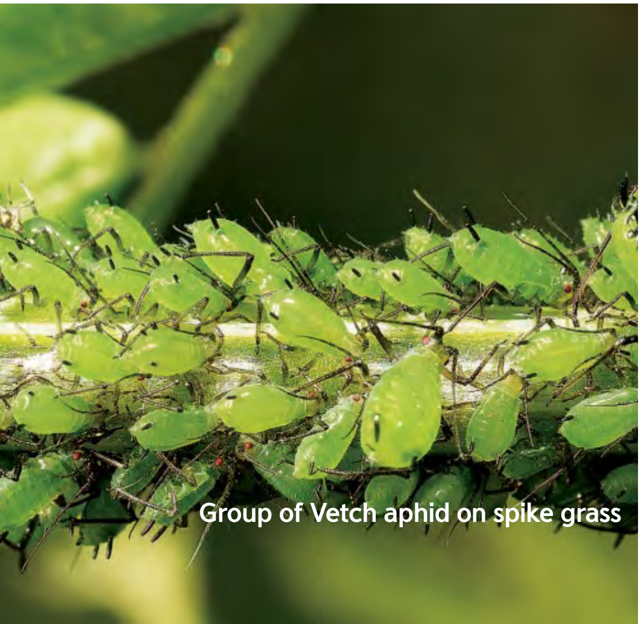




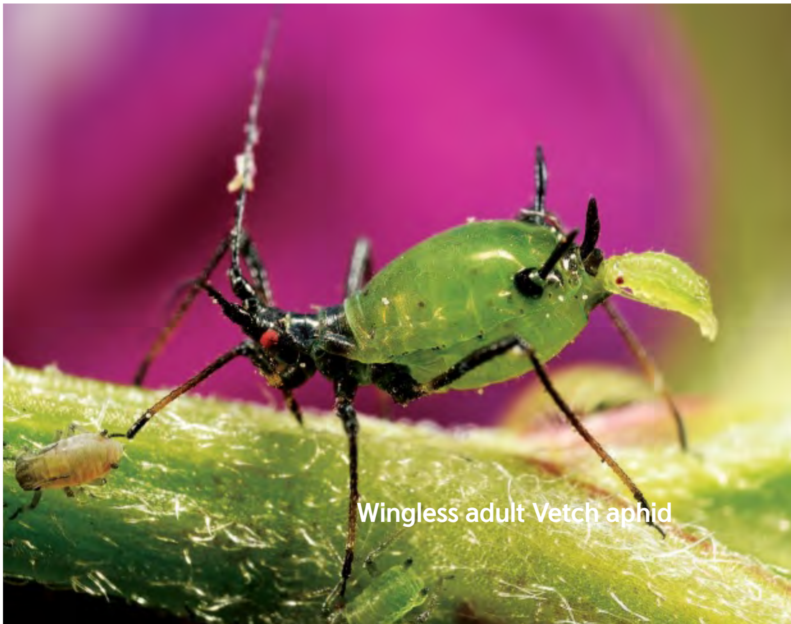
Winged adult Vetch aphid



Damaged by Vetch aphid
in early spring



Group of Vetch aphid on spike grass



Wingless adult Vetch aphid

Uroleucon aphid

Uroleucon formosanum

Description

The body length is about 3mm for winged nymphs and about 3.8mm for wingless nymphs. The host plant is primarily Lettuce, Sowthistle-leaved hawksbeard, and skewers. The color of the body is reddish-brown in both the winged (Alate) and the wingless nymphs (Apterous). The alate have developed foreheads, and the inside of them is straight and facing outward, and there are 3 to 4 setae with no pointed ends. The antenna (tactile sensory) is 6 segments, the third tactile segment is the longest, which is longer than the combined length of segments 4 and 5, and about 130 secondary sensor organs are protruding, which is distinguished from other species.

Lateral patterns are developed on the abdominal segment, and the anterior and posterior patterns of the cornicle are also clear. Skin scabs are formed on the dorsal plate, and each node is lined sideways, and there is one set of setae that are not sharp at the end. The length of the cornicle is 0.8mm in the shape of a cylinder, and it is slightly stretched toward the end and a net pattern at the end of the third The end-piece is about 0.5mm long, is narrow near the bottom, has a sharp tip, and has about 18 setae.

The Apterous have about 80 secondary tactile sensor on the third tactile segment and a stalk on the middle chest's inner bone.There is no lateral pattern on the abdomen, the pattern in front of the cornicle is thin, and the pattern behind the horn tube is wide. There are 2, 6, 4 skin scabs on the sixth to eighth abdominal pronotum, respectively, and there is 1 seta on this. The tip piece is not constricted, the tip is thin, and there are about 16 long and short setae.

Damage

A large group grows on the back of the leaf and sucks the fluid. It also transmits cucumber mosaic virus disease. A very similar species is the Uroleucon lactucicola. (Korea National Arboretum)

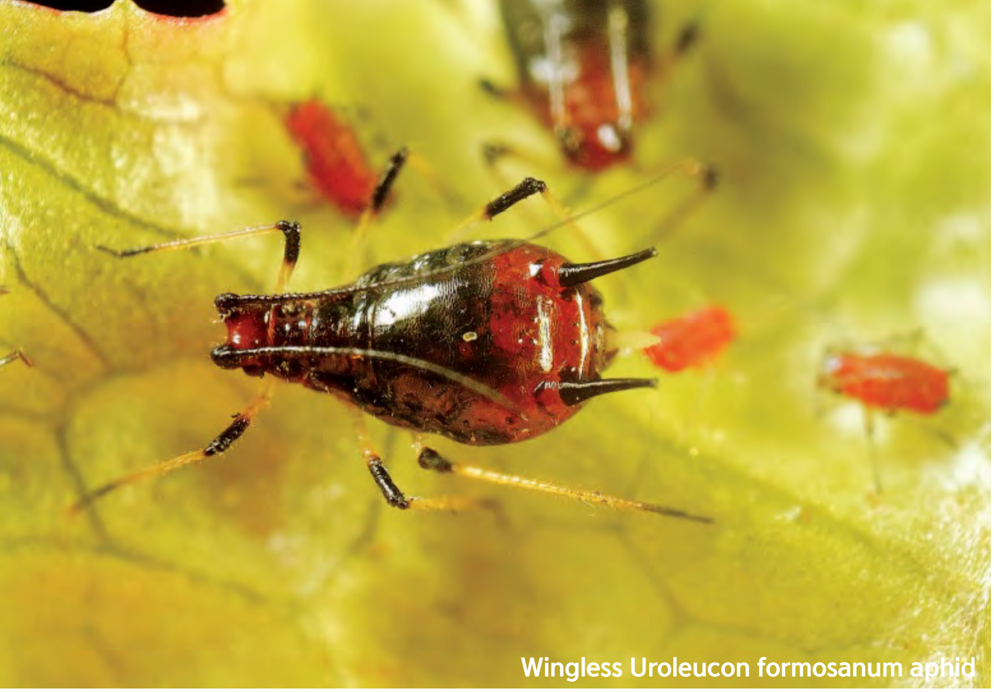
Refer to pages 25, 35~37

JADAM Natural Control Ratio

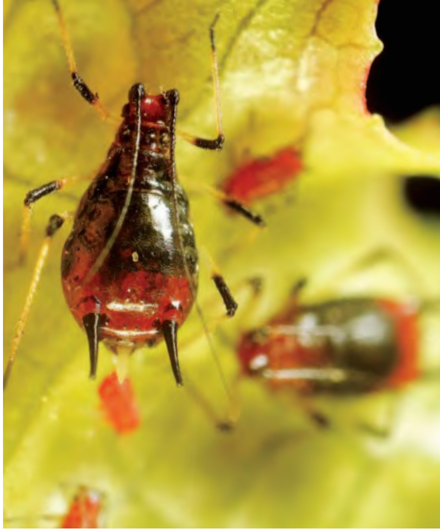
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

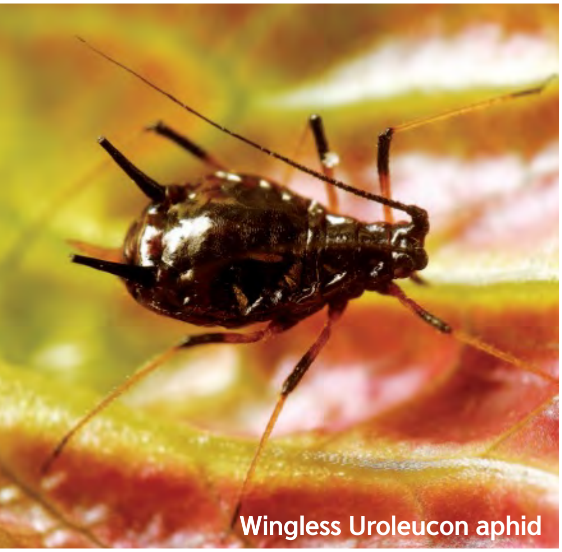
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

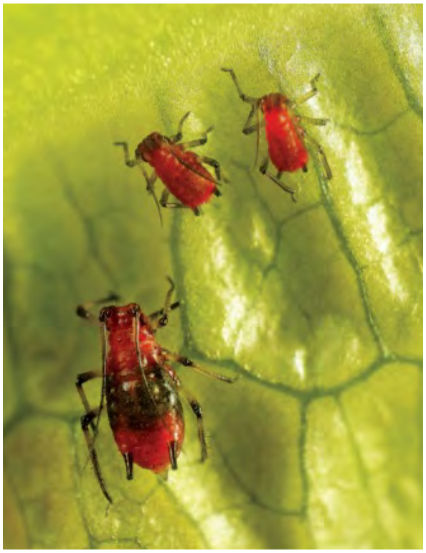


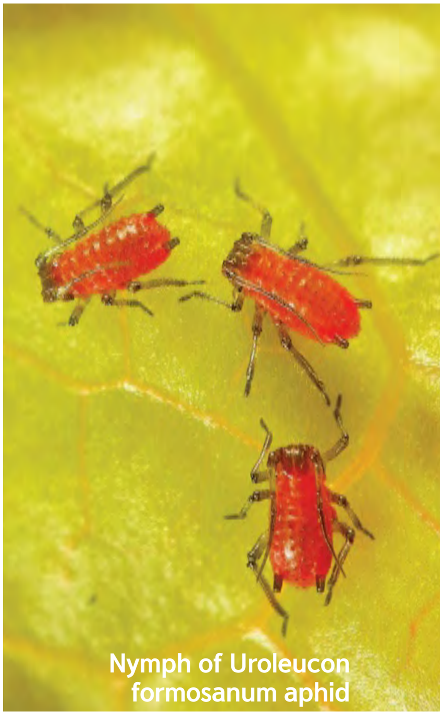
Wingless Uroleucon formosanum aphid



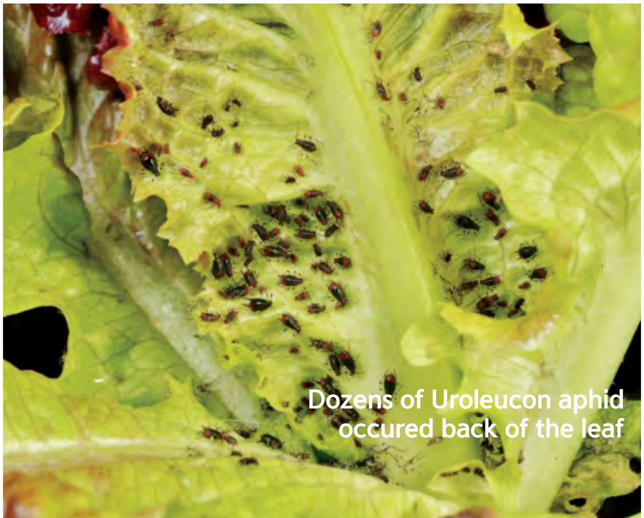


Wingless Uroleucon aphid

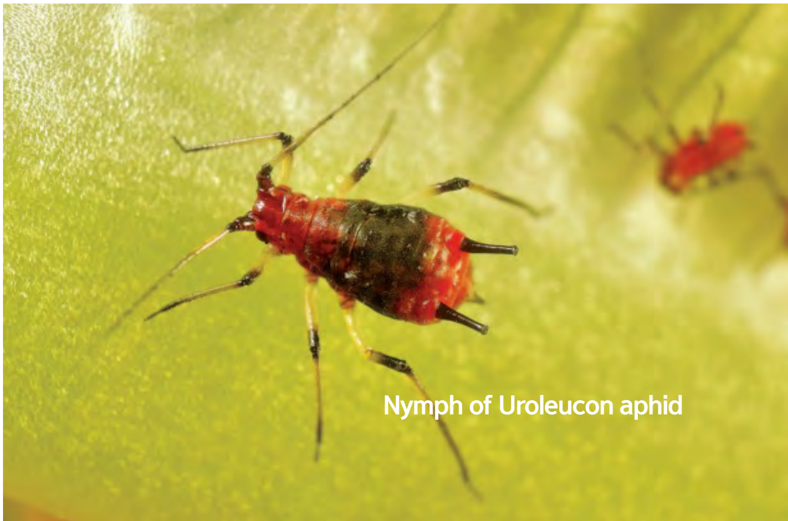




Nymph of Uroleucon formosanum aphid



Dozens of Uroleucon aphid occured back of the leaf



Nymph of Uroleucon aphid

Aphis egomae

Description

The body length of a wingless (apterous) adult aphid is about 1~2mm. It mainly lives on perilla. It is often distributed in Korea and Japan.

Life cycle

The initial outbreak is around the end of April on cultivated perilla, which is a species that results in significant damage, and its damage is recognizable with the naked eye. It has a very similar look as cotton aphids (Aphis gossypii), which makes it difficult to identify, but in most cases, the leaf curl is a sign of the presence of aphis egomae.

(Korea National Arboretum)

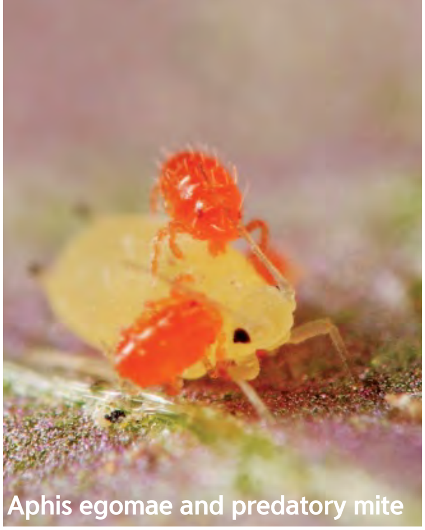
Refer to pages 25, 35~37

JADAM Natural Control Ratio

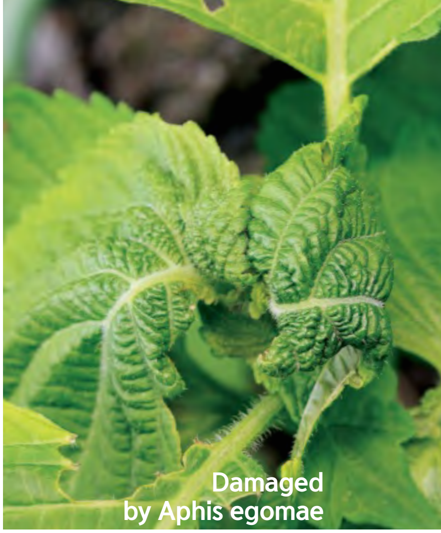
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

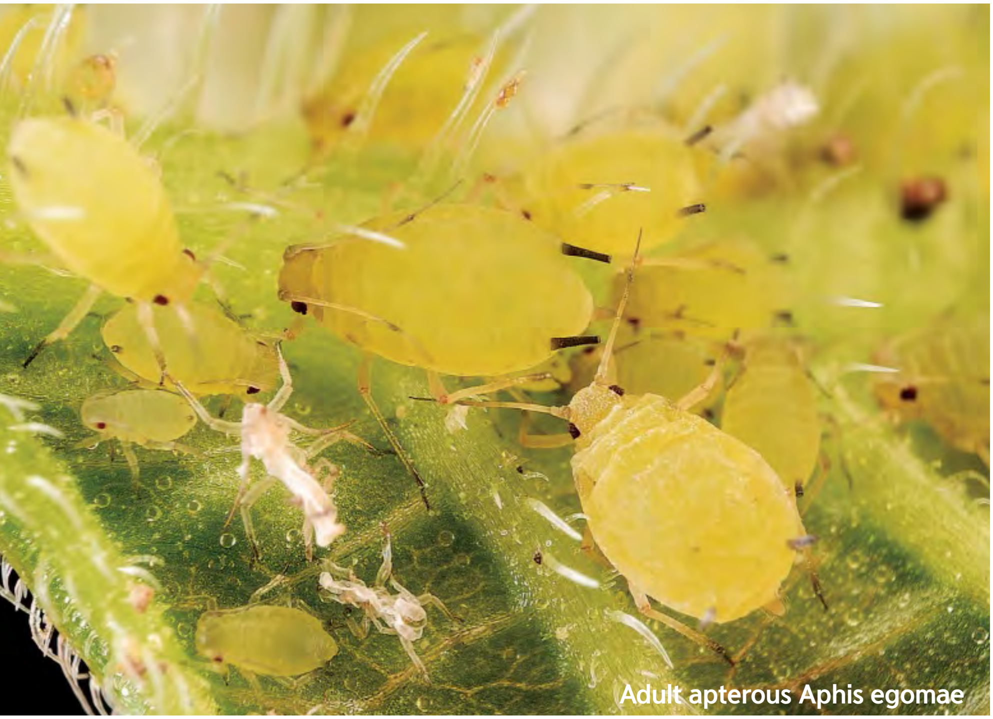
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



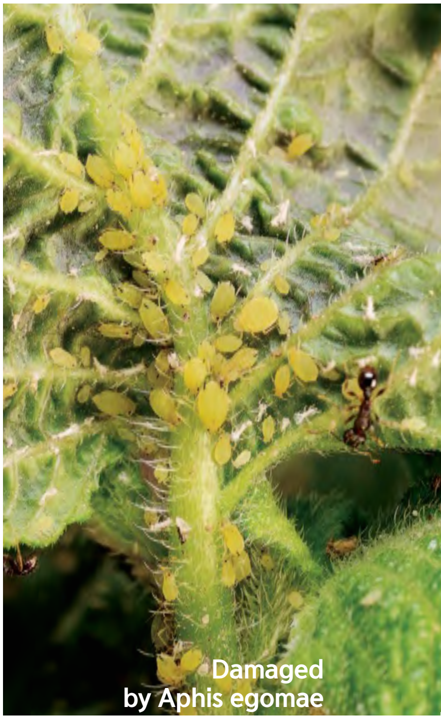
Aphis egomae and predatory mite



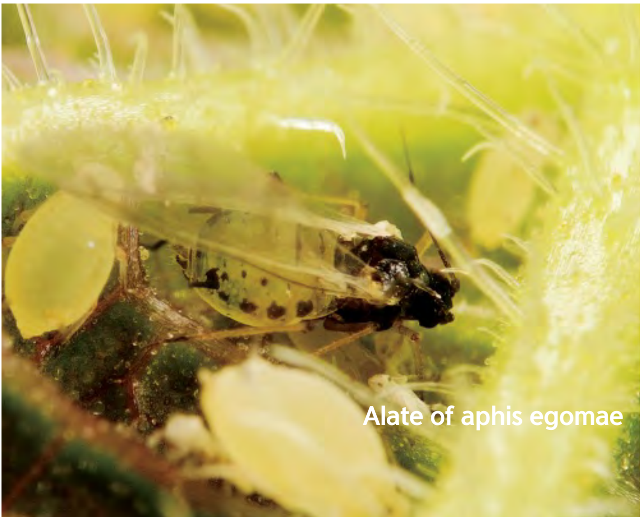
Damaged
by Aphis egomae



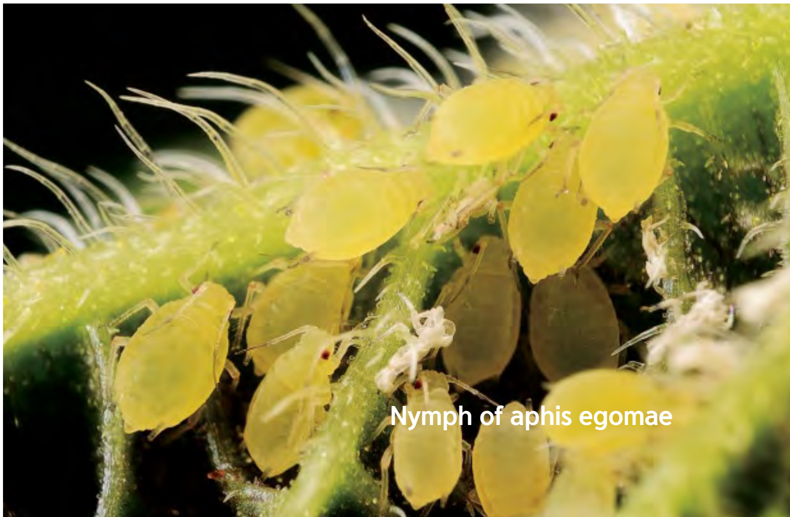
Adult apterous Aphis egomae



Damaged
by Aphis egomae



Alate of aphis egomae



Nymph of aphis egomae

Japanese butterbur aphid

Aphis fukii

Life cycle

It often parasitized on the japanese butterbur, a plant in the asteraceae family, and atrophies the leaves of Japanese butterbur. The ecosystem or life history is not well known. There are countless aphids that coexist with ants on the backside of the Japanese butterbur's leaves. It occurs from June to July.

Damage

It absorbs the leave's fluid to harm the plant, causing wrinkle on its leaves and affects the growth.
(National Crop Pest Management System/NCPMS)

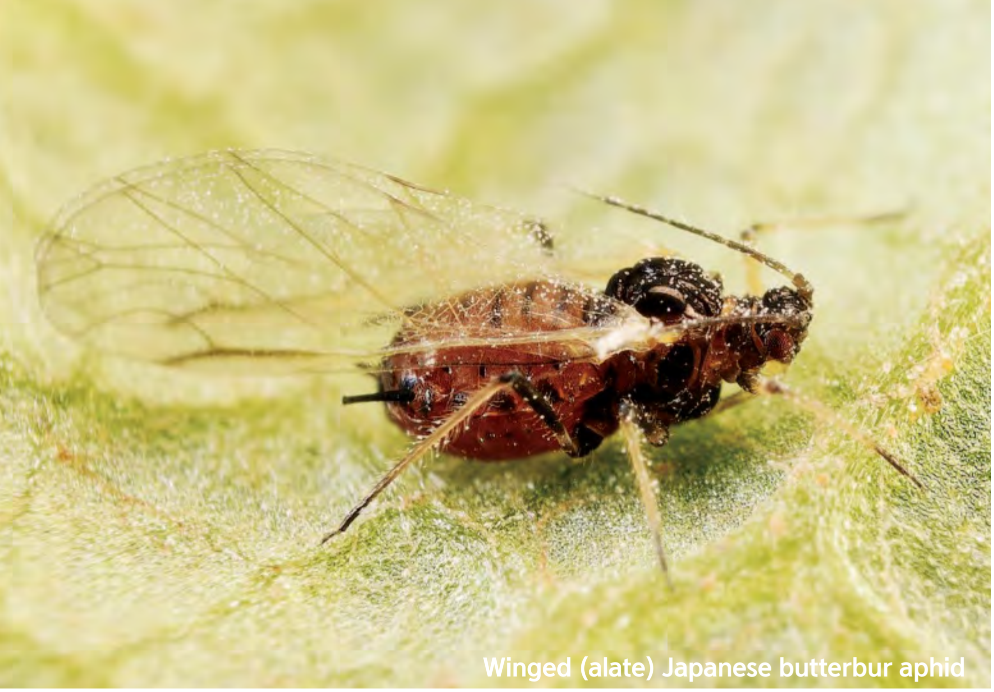
Refer to pages 25, 35~37

JADAM Natural Control Ratio

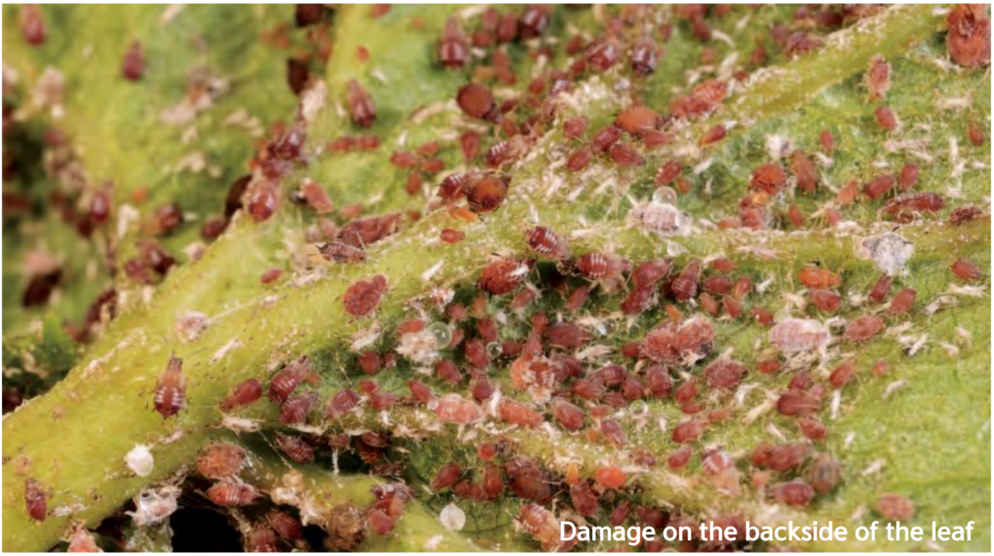
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	7days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

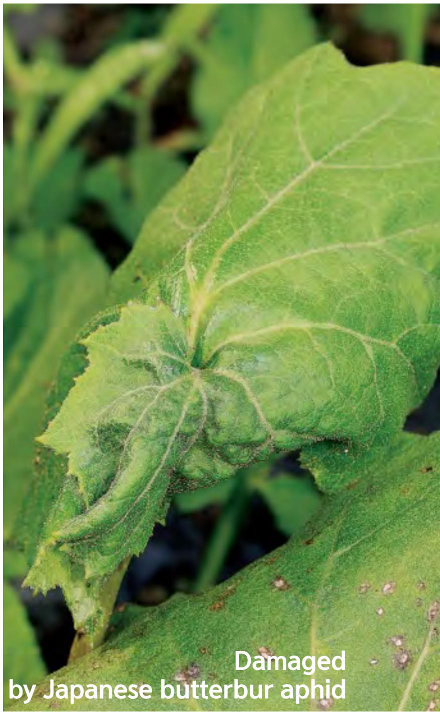
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



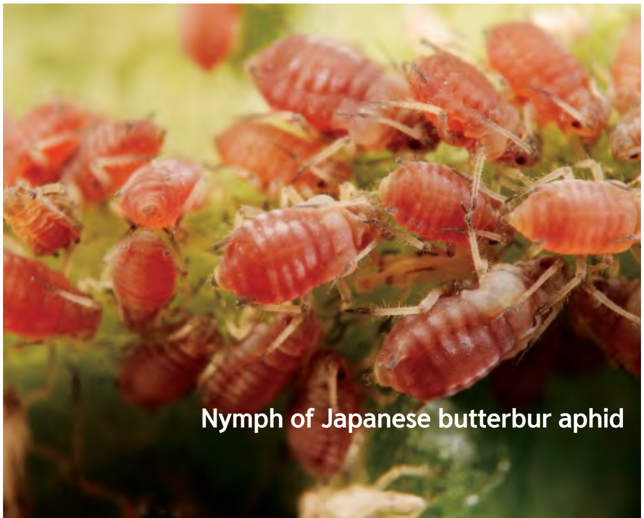
Winged (alate) Japanese butterbur aphid



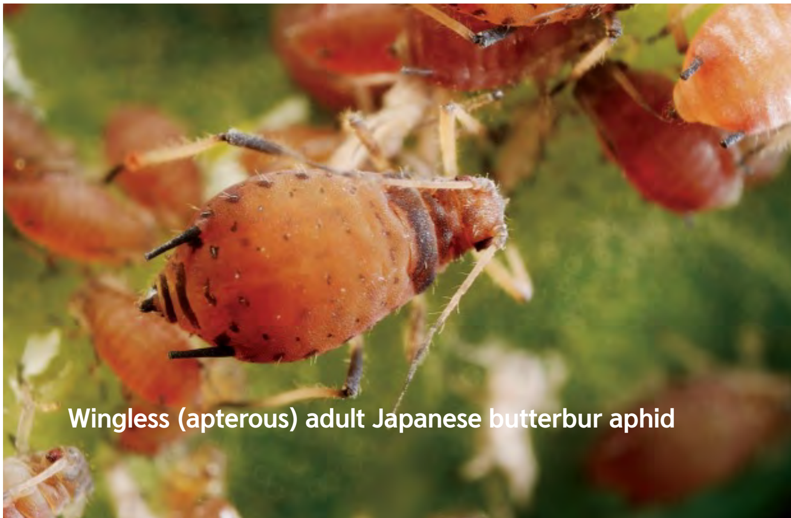
Damage on the backside of the leaf



Damaged
by Japanese butterbur aphid



Nymph of Japanese butterbur aphid



Wingless (apterous) adult Japanese butterbur aphid

Melon aphid, Cotton aphid

Aphis gossypii

Description

The body length of the cotton aphid is 1.5mm, and its body color is greenish-yellow or blackish green depending on the season; and the cornicle has a cylindrical scale pattern and the bottom part is black and thick. Alate has a body length of 1.4mm and varies greatly depending on the season. They have many green lines in spring, yellow or yellowish-brown in summer, and brown or dark brown in autumn. In general, the head and chest are black, and the abdomen is green to yellowish-green, and there are black spots.

Life cycle

They birth dozens of generations per year and, like the green citrus aphid, winters as an egg in the surrounding host plants. Eggs that have wintered around the citrus farm hatch in the spring when spring shoot sprout and the female adult alate flies to the citrus farm and begins to multiply, causing damage to its citrus tree.

In general, it starts to occur from the end of May, and the density is highest from late May to early June in spring and from late July to early August in summer. In particular, the occurrence is minor in summer. Another ecology is similar to that of green citrus aphid (Aphis spiraecola).

Damage

It sucks the fluid of the plant while parastiting on it. And causes malformation of flower and affects the growth of the plant including the damage on its fruits and soot symptoms due to secretions from the aphid. Among the damage caused by cotton aphids, the symptom that is distinguished from the green citrus aphid is that the cotton aphid also acts as a vehicle for transmitting viruses. When the aphid sucks the fluid, the virus enters the aphid's body through its snout and then transfers the virus when it sucks other healthy plants.

(National Crop Pest Management System/NCPMS)

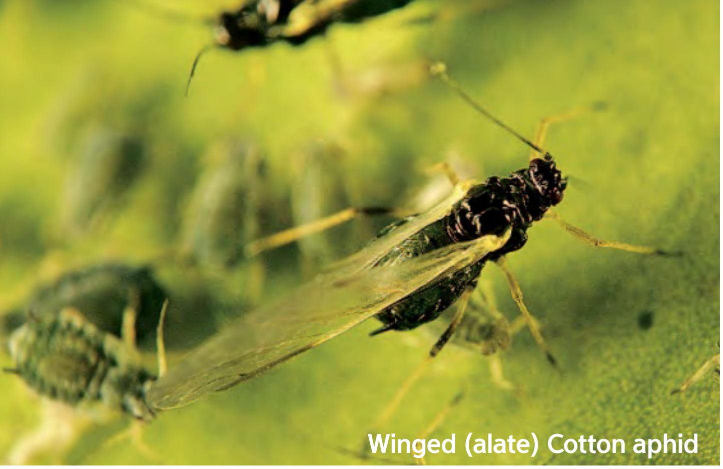
Refer to pages 25, 35~37

JADAM Natural Control Ratio

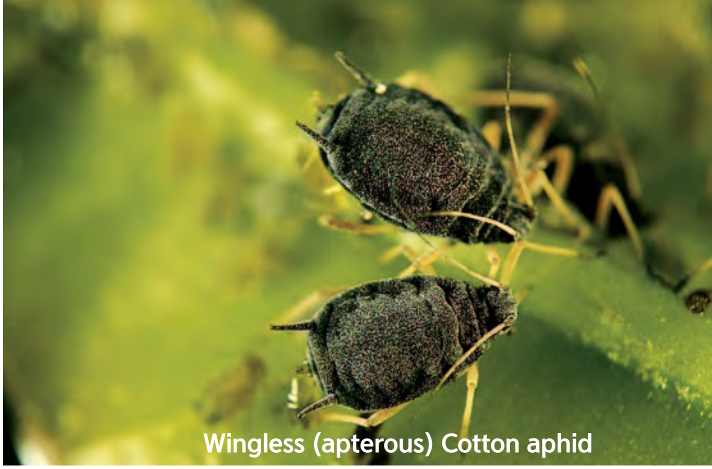
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil	80g		
Control interval	7days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

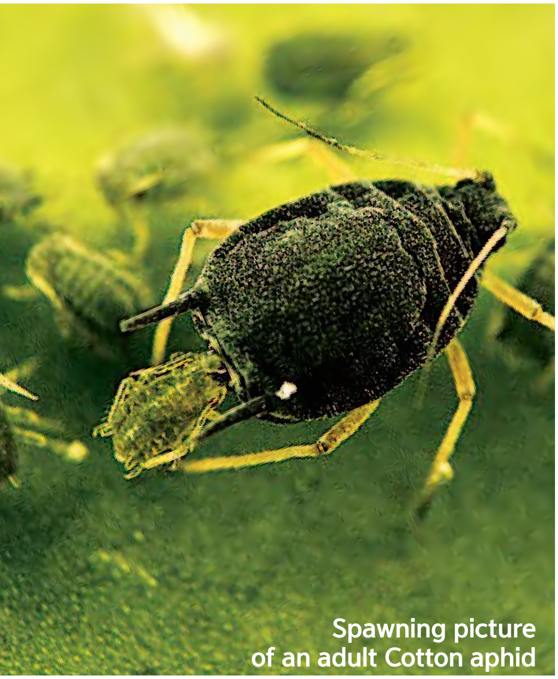
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



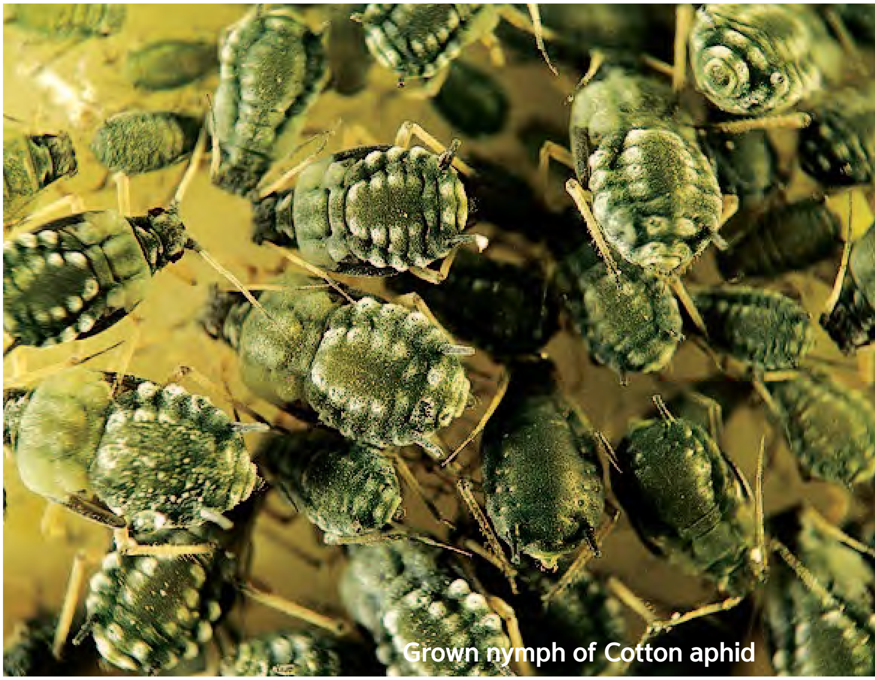
Winged (alate) Cotton aphid



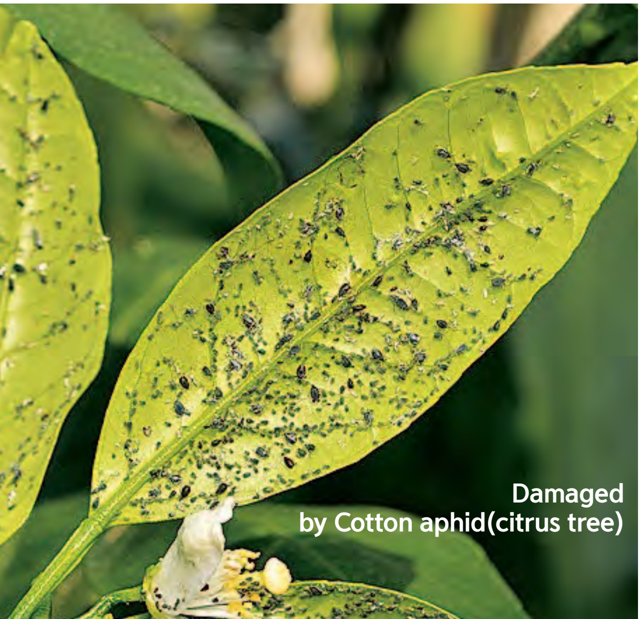
Wingless (apterous) Cotton aphid



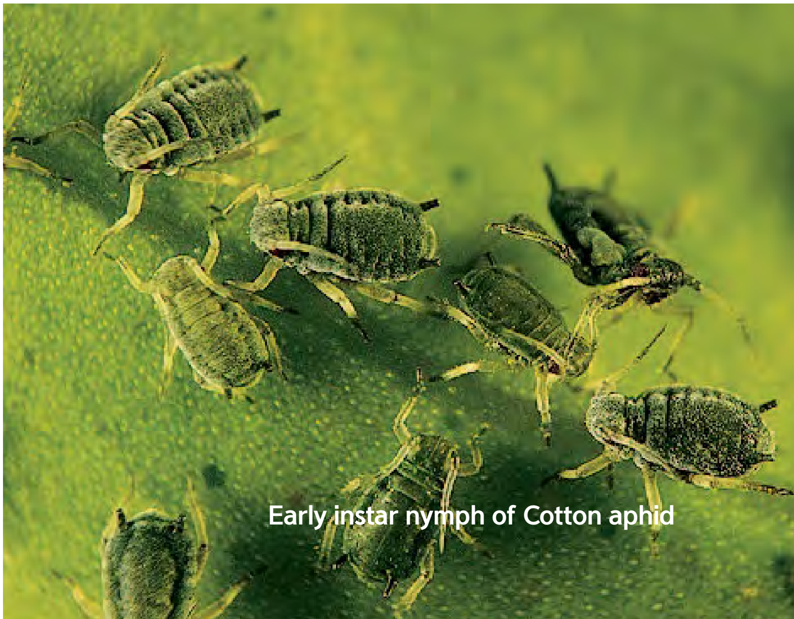
Spawning picture
of an adult Cotton aphid



Grown nymph of Cotton aphid



Damaged
by Cotton aphid(citrus tree)



Early instar nymph of Cotton aphid

Turnip aphid

Lipaphis pseudobrassicae

Description

Aleta's (winged) body length is 2.2mm. Its body color is black or black-green, covered with pale white powder, and has no luster. Small black patterns are lined up on the back of the sides. The cornicle is dark or almost black and has a plastic pattern in the shape of a slightly convex cylinder at the end, and has a rim and a rim band at the end.

The body length of apterous (wingless) is 2.6mm, ovate, light green to dark green, with light white powder. The cornicle is yellowish-brown, but the end is black or dark in the shape of a cylinder.

Life cycle

Turnip aphid commonly occurs on radish, Chinese cabbage, Cruciferae grass, wavy bittercress (Cardamine flexuosa), and overwinters as an egg. The size of turnip aphid decrease when the density of aphids increases on the host plant while the winged (alate) turnip aphid migrate to other host plant.

The stem mother hatched in late April to early May reproduce wingless (apterous) aphids, and the offspring live on shoots or new leaves, and when winged (alate) aphids grow, they move to the summer host of cruciferous plants.

In the summer, the density temporarily decreases due to high temperatures, but they proliferate again in mid-September, and the temperature decreases after breeding for 10 generations in the summer period. The alate forms again at the end of October when the length of days shortened. It then flies to the cruciferous weed and becomes a spawning female. Early generations occur about 20 times a year, and late generations occur about 7 times.

Damage

Unlike other pests, aphids carry viral diseases as secondary damage in addition to direct damage. These viral diseases are mediated by the absorption of aphids from early instar aphid, resulting in necrotic spots or impeding the above-ground or underground areas, which later becomes a cause of low-value product.

(National Crop Pest Management System/NCPMS)

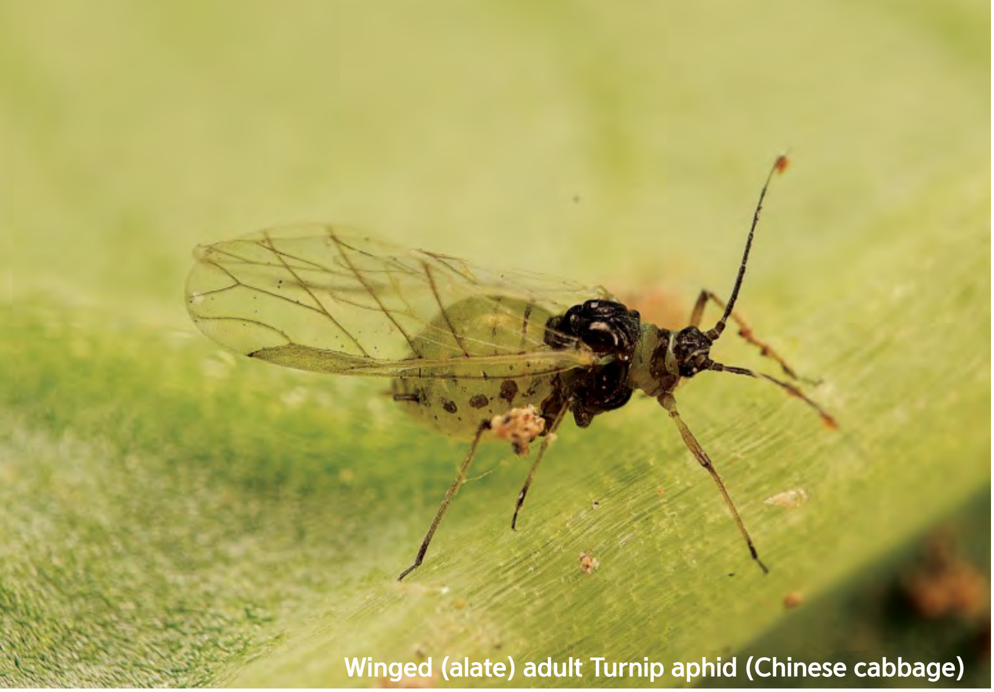
Refer to pages 25, 35~37

JADAM Natural Control Ratio

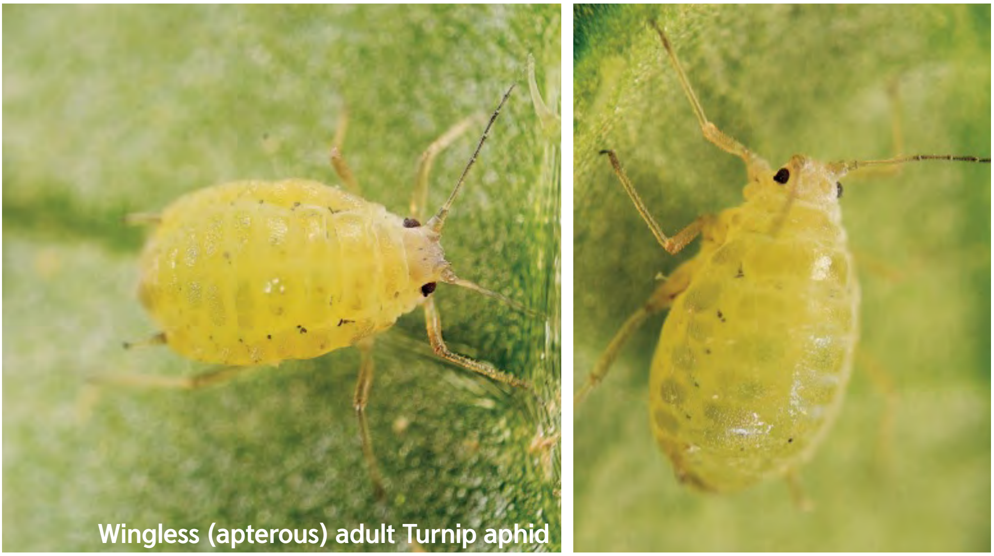
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

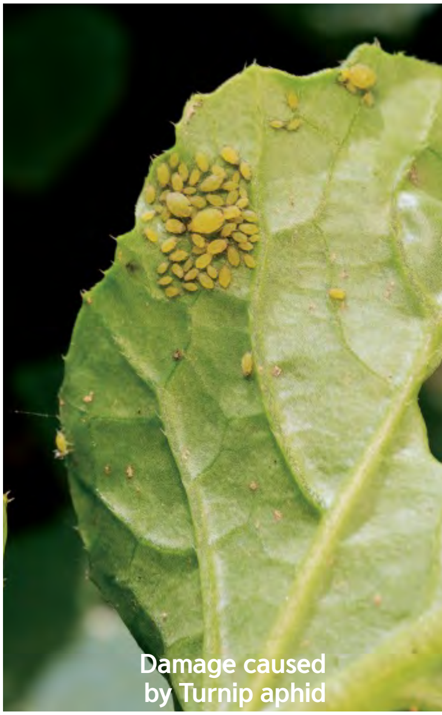
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Winged (alate) adult Turnip aphid (Chinese cabbage)



Wingless (apterous) adult Turnip aphid



Damage caused by Turnip aphid

Group of a Turnip aphid

Nymphs of Turnip aphid

Oleander aphid

Aphis nerii

Description

The body length of a female born apterous (wingless offspring) is 2.5 mm, the body is yellow, and the tactile sensor and legs are black. The body length of a female wingless offspring is 2.2 mm, and the head, antennae, and pronotum are yellow, and the middle and back thorax are black. The abdomen is yellow, and there is a black pattern at the bottom of the cornicle. The cornicle, end, and bottom plate are black.

From May to June, wingless females born and groups in the shoots of host plants, and when the density of parasitic is high, winged females appear and migrate to nearby trees to reproduce. In July-August, when shoots stop growing and leaves harden, parasitism occurs on flower stalks, and parasitic density decreases. The density increases again in September and clusters not only appear on flowering peduncle but also remains after flowering.

Life cycle

Around May-June, the host plant's shoots and the backside of the leaves are clustered and absorbed, so the growth of shoots is inhibited, and the budding is also affected. Although the leaves do not dry out or the branches die but cause soot disease affecting the aesthetics. They are common in parks in the suburbs of the city. (Korea National Arboretum)

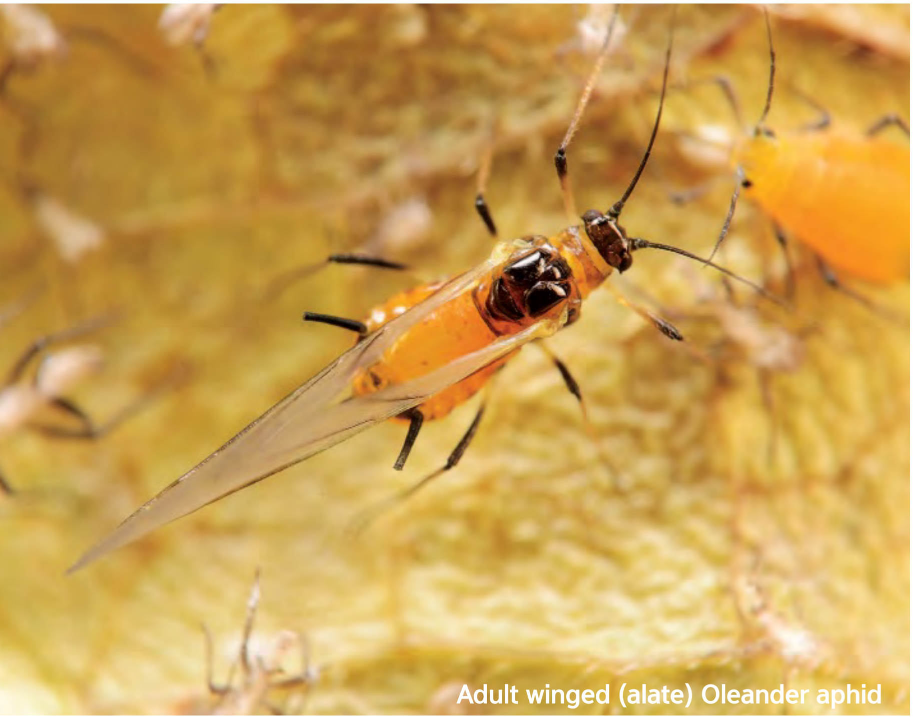
Refer to pages 25, 35~37

JADAM Natural Control Ratio

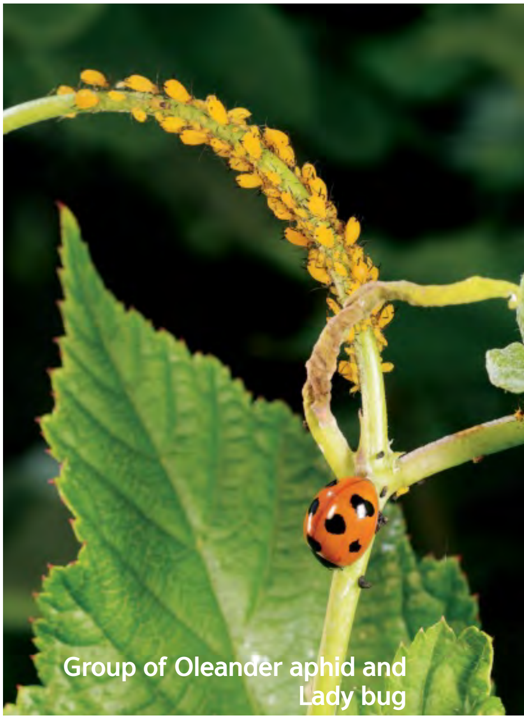
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

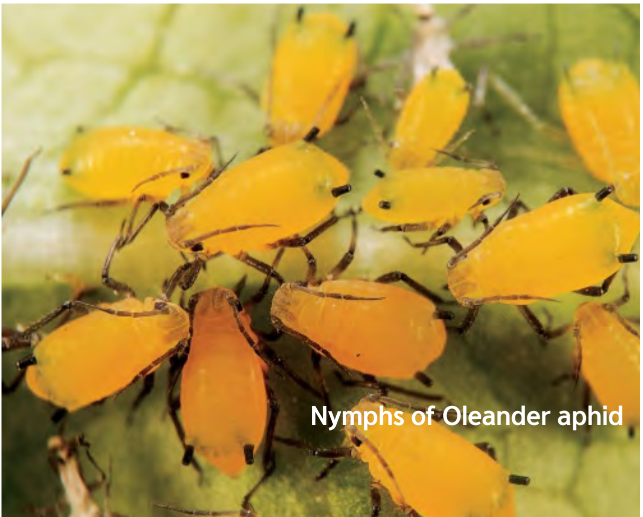
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



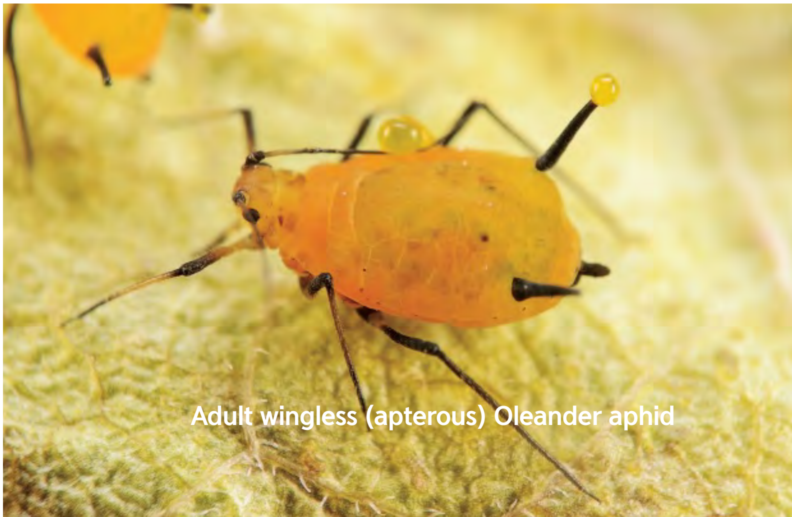
Adult winged (alate) Oleander aphid



Group of Oleander aphid and Lady bug



Nymphs of Oleander aphid



Adult wingless (apterous) Oleander aphid

Chestnut aphid

Myzocallis castanicola

Description

Body length is about 2~2.4mm. The body of an adult winged (alate) Chestnut aphid is ovate, yellowish-brown, and its antennae are light yellow, much shorter than the body length. Wings are transparent but dark brown with a dark brown band along the wing vein, and the wing pattern is dark brown. There are dark brown spots on the abdomen, and there are 2 large whitish spots between the cornicle. The cornicle is short, but the lower part is extensive, so it is wider than it is long.

Life cycle

If the leaves are contaminated with soot and discolored in-between period of summer to autumn, it is often caused by the chestnut aphid. It parasitizes along the leaf veins behind the leaves of chestnut trees during the year and begins sexual reproduction in autumn, spawning near the snow or in the interstitial area, then overwinters. If the outbreak is severe, early fallen leaves can occur in late summer to early winter. (Korea National Arboretum)

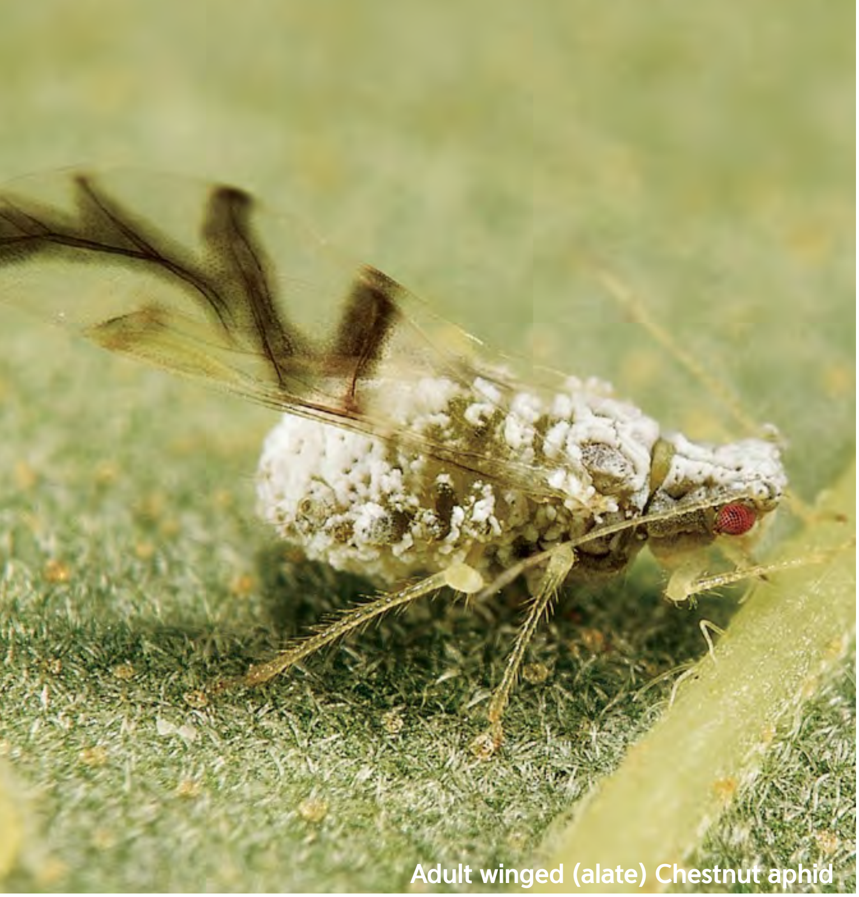
Refer to pages 25, 35~37

JADAM Natural Control Ratio

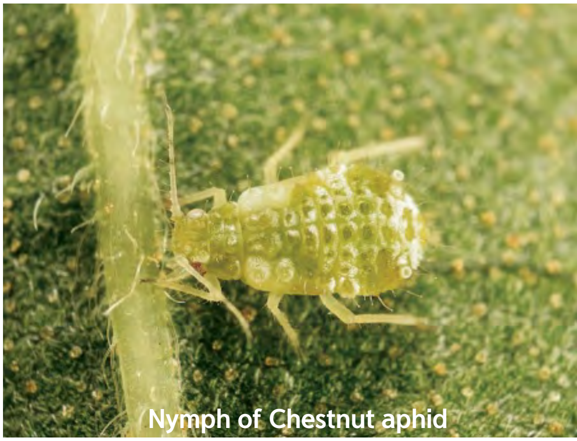
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

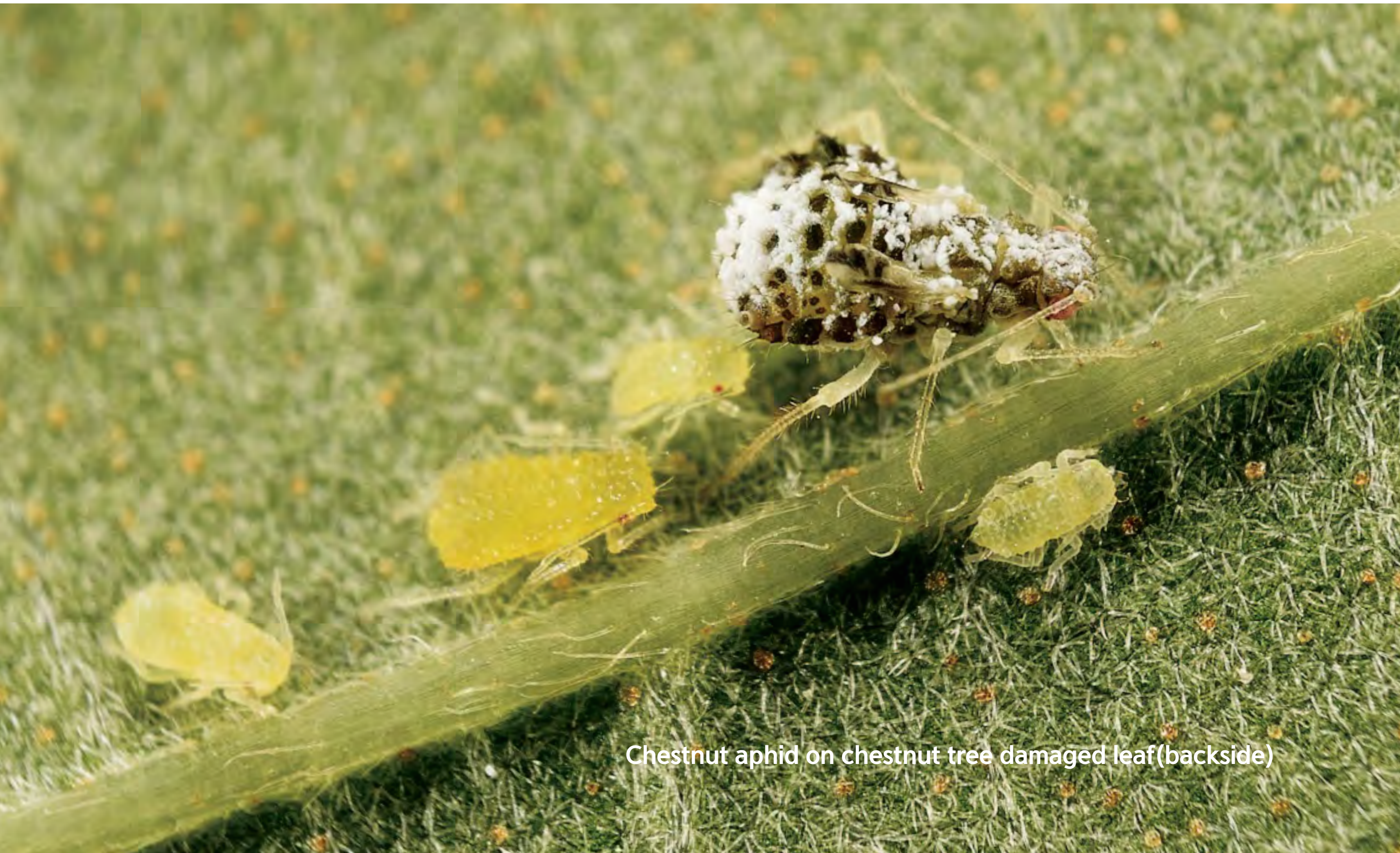
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult winged (alate) Chestnut aphid



Nymph of Chestnut aphid



Chestnut aphid on chestnut tree damaged leaf(backside)

Great Chestnut Aphid

Lachnus tropicalis

Description

Adult winged (alate) Large chestnut aphid has a body length of 3.1~4.0mm and a wing length of about 13mm, long egg-shaped, and the color of the body is glossy black and silver. Adult males are smaller than females. The abdomen is slightly pale, and the wings are black, making it easy to distinguish from other species. There are white transparent patterns on the middle part of the fore wing and the front edge tip.

The legs are particularly long and hairy. The wingless (apterous) female adult of the Large chestnut aphid is about 5mm long, black, and has a plumped abdomen. There are many hairs on the legs, the cornicle is black, and its length is shorter than the diameter and it is on the long hair-like setae. Eggs are about 1.5mm long, oval, glossy, dark brown at first, but turn black later.

Life cycle

The nymphs that hatched in early April after wintering as a large pile of black eggs laid on the stems move to the sprout and continue to multiply, occuring 10 times a year. In autumn, males and females appear and mate, and females that lay eggs inhabit the stems in groups and lay eggs intensively, forming a pile of 5,000 to 6,000 eggs.

Damage

Nymph and adult aphid parasitize on the branches and trunks of chestnut, daimyo oak, konara oak, cork oak, and false acasia tree. It lives in groups on branches from spring to autumn and suctions the fluid. If the outbreak is severe, the growth of the sprout will be affected (Doosan Encyclopedia)

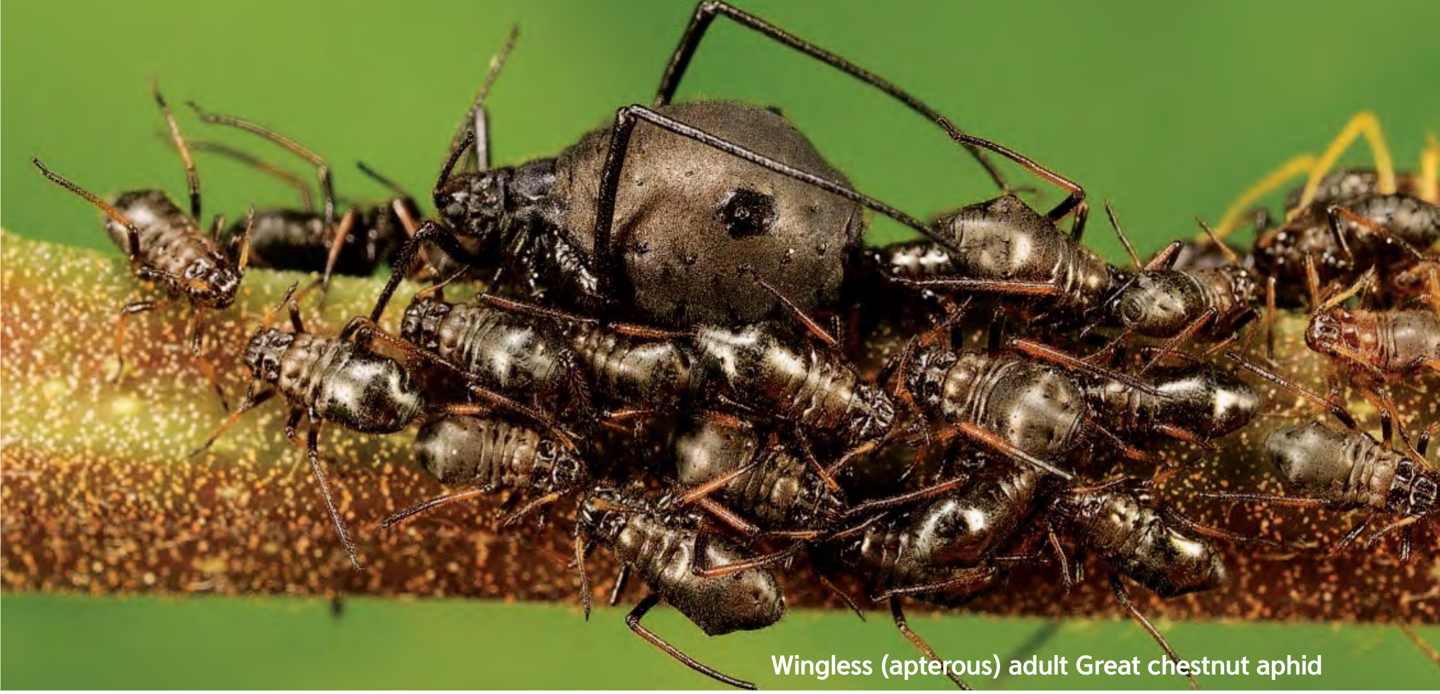
Refer to pages 25, 35~37

JADAM Natural Control Ratio

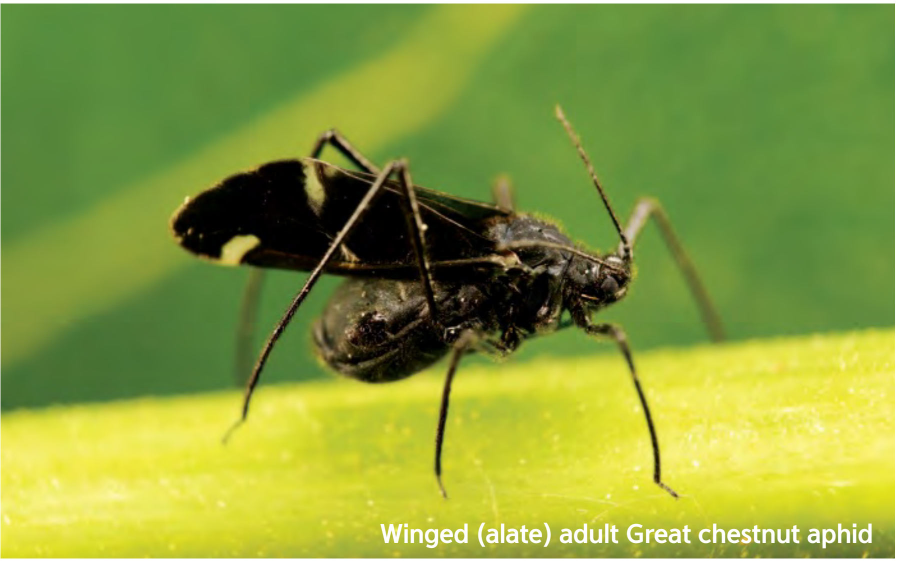
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

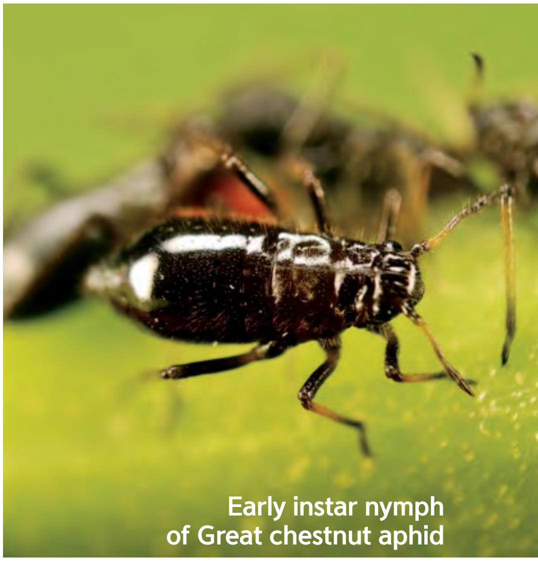
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



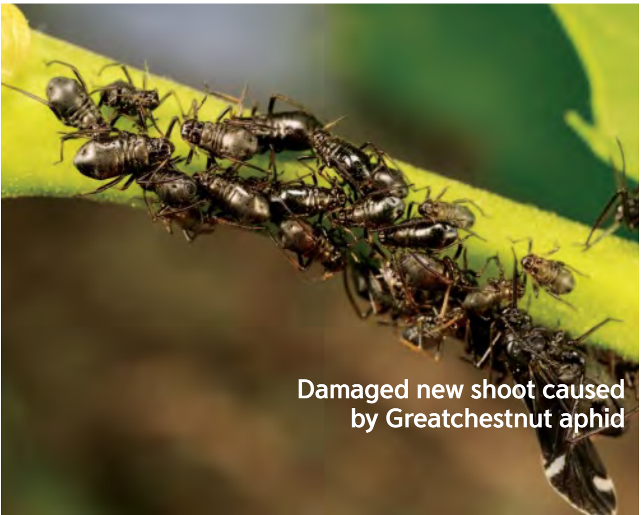
Wingless (apterous) adult Great chestnut aphid



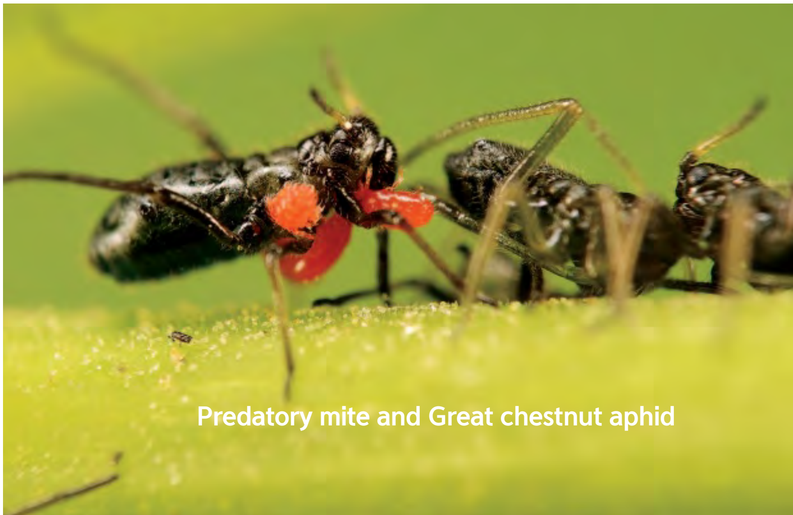
Winged (alate) adult Great chestnut aphid



Early instar nymph
of Great chestnut aphid



Damaged new shoot caused
by Greatchestnut aphid



Predatory mite and Great chestnut aphid

Kuwana pear aphid

Prociphilus kuwanai

Description

Wingless (apterous) adults are yellow-green, and their body size is about 2 to 3mm, and the tail pattern is wrapped in a white cotton-like material. Winged (aleta) adults have a black body, transparent wings which resemble winged (aleta) aphids.

This species frequently occurs in pear orchard in spring causing damage. It is believed to cause less damage when predator insect groups such as ladybugs, and grass dragonflies population is well-managed in the field. Although only one predatory activity was photographed in the pear tree colony where larvae were concentrated in flower, all the predatory insects mentioned above were observable during farming.(Deogkee Park)

Life cycle

They overwinter as an egg and hatches in April. From April to June, They mainly damage the leaves, and Alate (winged) appear in June and migrate to the summer host and cannot be found in pear trees during the summer. In early October, Alate (winged) fly to the pear tree and lay winter eggs.

Damage

Damaged leaves are dry on the reverse side and dry in the shape of a leaf stem, and the color becomes thinner as more damage occurs. On the inside of the leaf's dried part, the pale yellow Apterous (wingless) covered with white cotton-shaped material and numerous bead-shaped excrement. Excretion falls to the bottom of the damaged leaf, causing soot disease, and white material is mixed together. (National Crop Pest Management System/NCPMS)

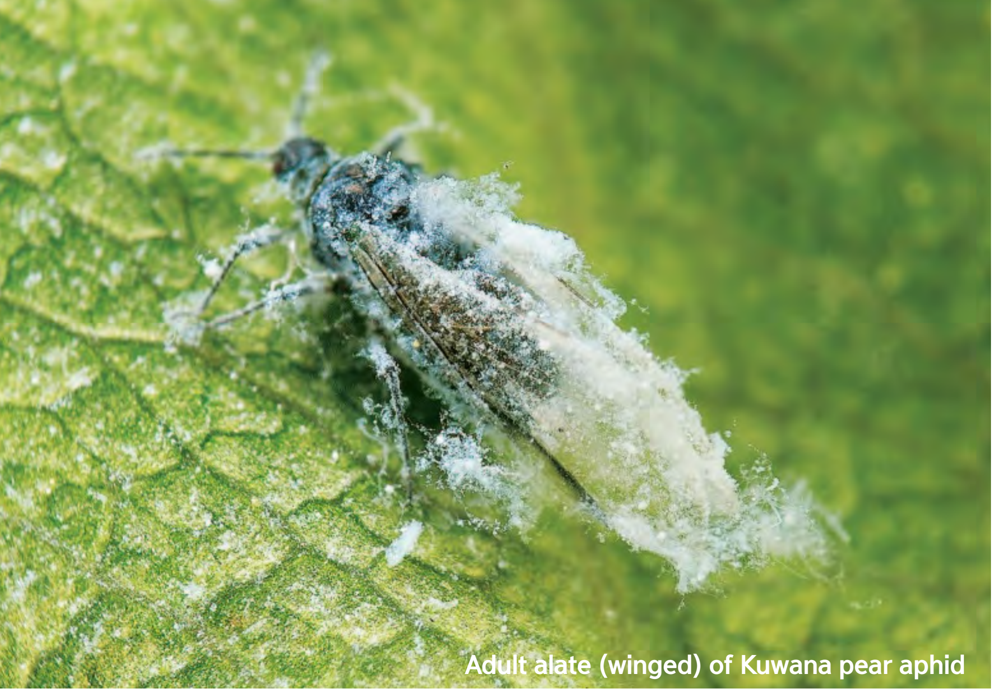
JADAM Natural Control Ratio

Refer to pages 25, 35~37

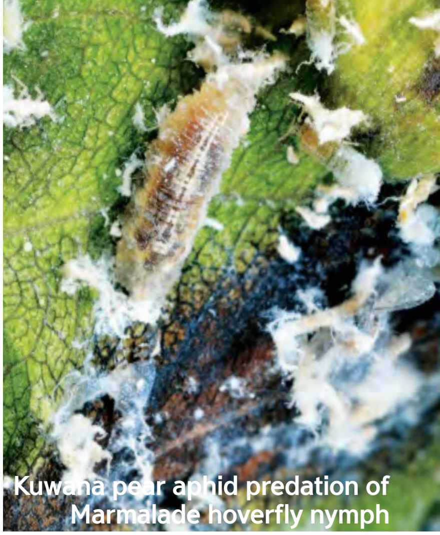
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			40g
Fine soil	80g	40g	60g
Control interval	7days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

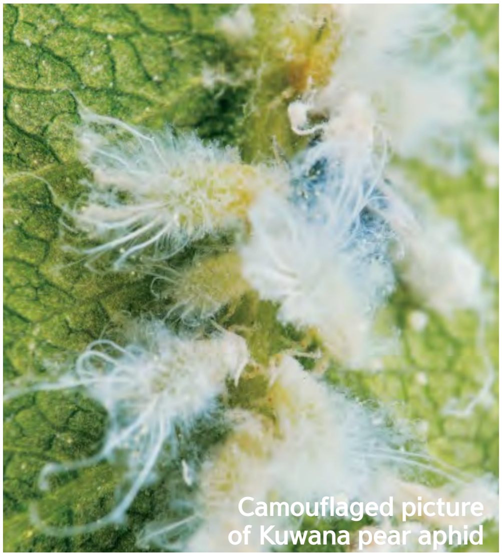
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



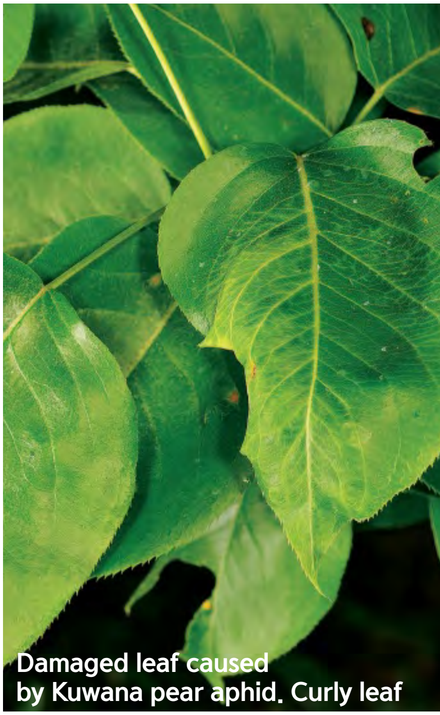
Adult alate (winged) of Kuwana pear aphid



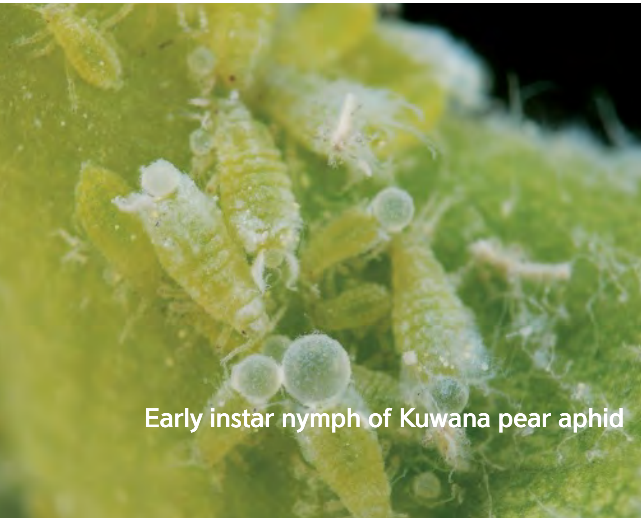
Kuwana pear aphid predation of Marmalade hoverfly nymph



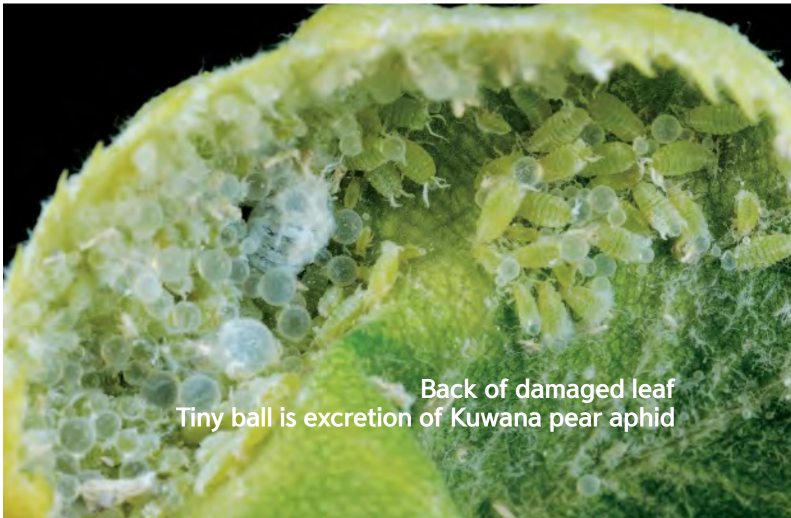
Camouflaged picture of Kuwana pear aphid



Damaged leaf caused by Kuwana pear aphid. Curly leaf



Early instar nymph of Kuwana pear aphid



Back of damaged leaf
Tiny ball is excretion of Kuwana pear aphid

English grain aphid

Sitobion avenae

Description

The alate (winged) is about 2.9mm long. The body color is black-green and has brown or reddish-brown patterns. The head is black-brown, and the eyes are red. The abdomen is black-green, and the cornicle is glossy black. The apterous (wingless) body length is the same as the alate, and the cornicle has a long cylindrical shape of 0.75mm and has a rim at the end.

Life cycle

The host plants are barley, rye, rice, sweet sorghum, and walnut. It overwinters as eggs, and from the beginning of barley growth, adult aphid and nymph attach to the back of the leaves and sucks the plant's fluid, but when the neck of the panicle appears on the crop, the density increases rapidly. It parasitizes and damages the crop, so the seed does not well ripen, and if it is severe, it dries to death.
(Doosan Encyclopedia)

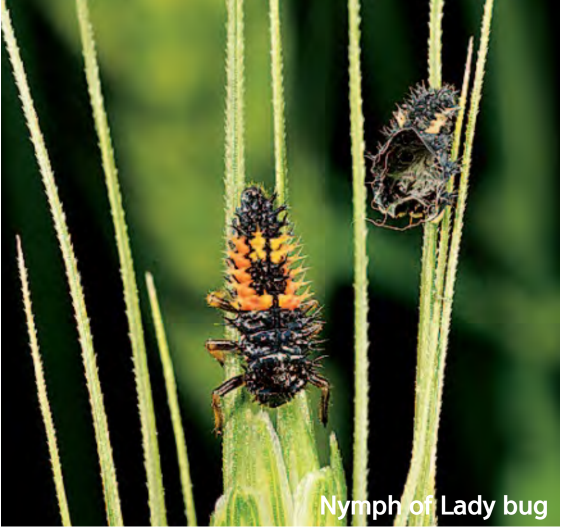
Refer to pages 25, 35~37

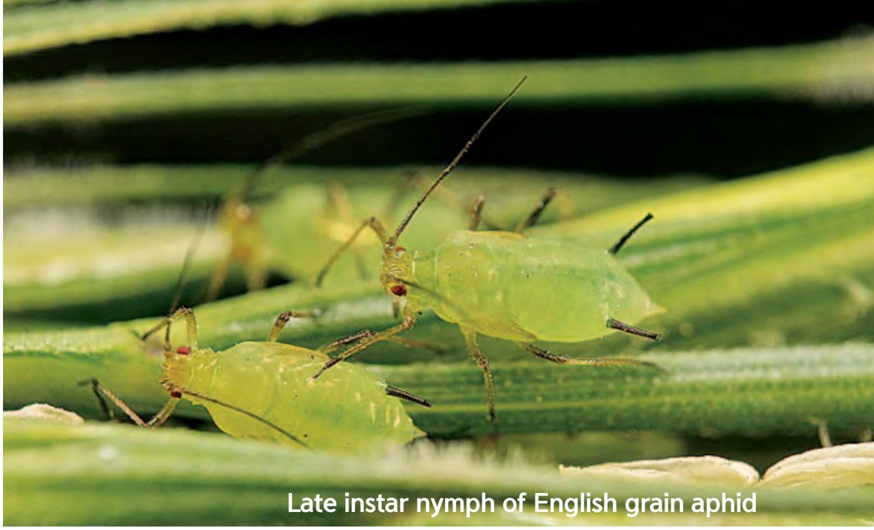
JADAM Natural Control Ratio

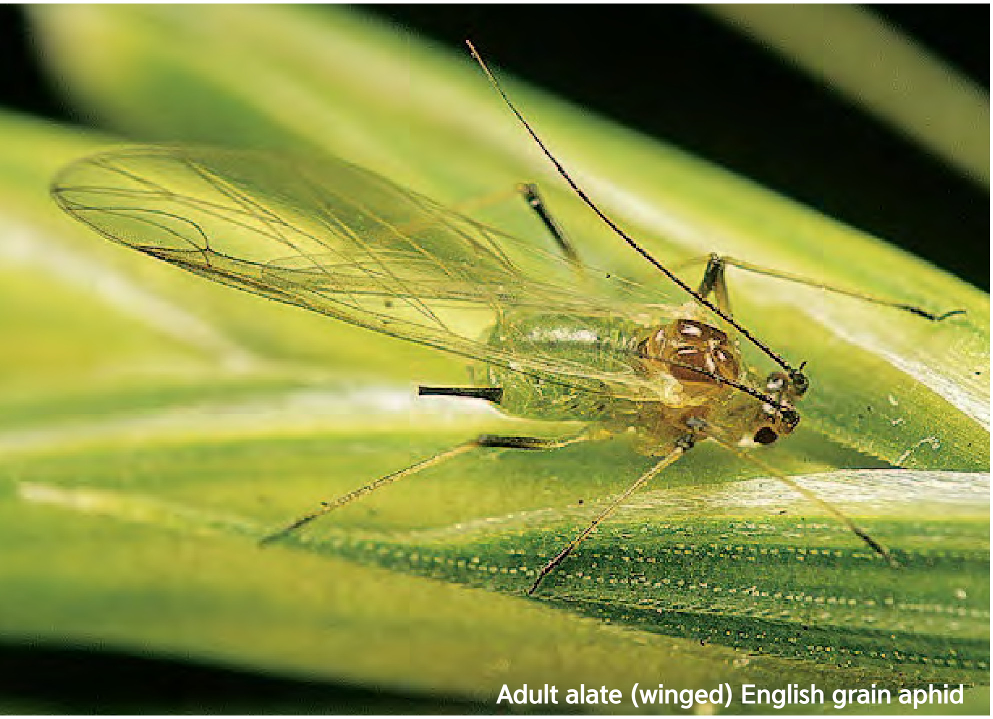
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			60g
Control interval	10days	Visible effect	3hours

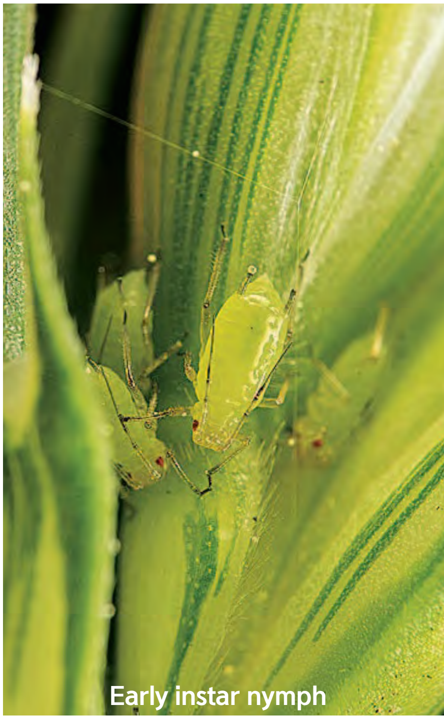
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

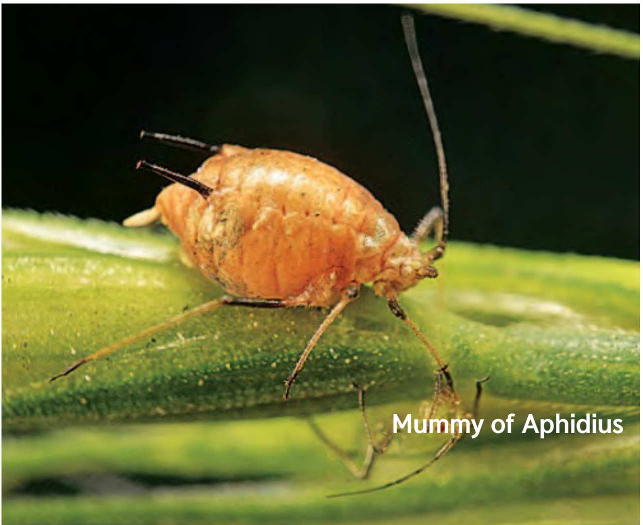
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

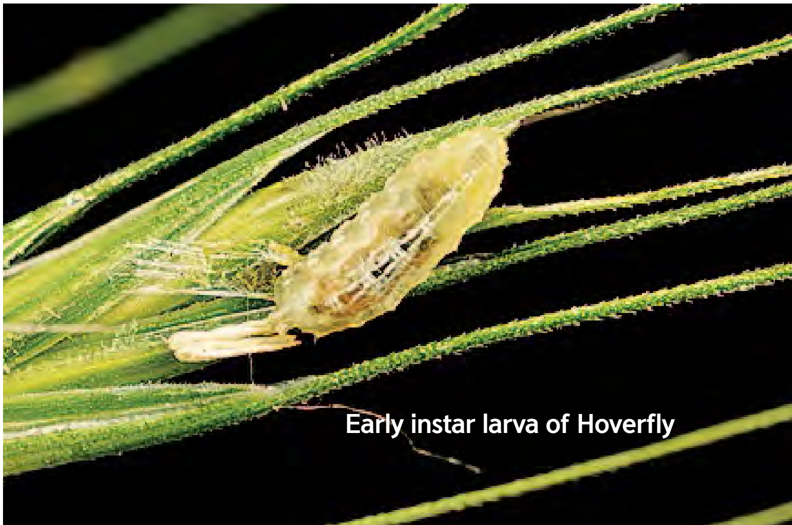

Nymph of Lady bug


Late instar nymph of English grain aphid


Adult alate (winged) English grain aphid


Early instar nymph


Mummy of Aphidius


Early instar larva of Hoverfly

Mealy plum aphid

Hyalopterus pruni

Description

The alate (winged) is about 1.5mm long. The body color is greenish-yellow. The antenna (tactile sensory) is divided into 6 segments and is black, and the bottom of the third tactile segment is green. The head and thorax are black, and the lower part of the thigh and the middle part of the calf is light green. The cornicle is black and the length is short.

The body length of an apterous (wingless) is 1.75mm, which is a long round shape. The body color is green and covered with white waxy powder. The head is green, and there is no forehead. The cornicle has a convex cylinder shape in the central part and is black.

Life cycle

It overwinters as eggs in the bumps of branches or trunks of peach trees, plum trees (Prunus salicina), and Japanese plum trees (Prunus mume). Hatching from the egg, the stem mother continues to reproduce until late autumn and occurs 10 times a year. The larvae are light green and covered with beeswax powder. The Mealy plum aphid wintering insects and larvae parasitize on the back of the leaves and suck the plant's fluid.

Damage

Because the body is covered with white waxy powder, the damaged leaves appear to be covered with white powder. If the outbreak is severe, it causes soot disease because they secretes nectar.
(Doosan Encyclopedia)

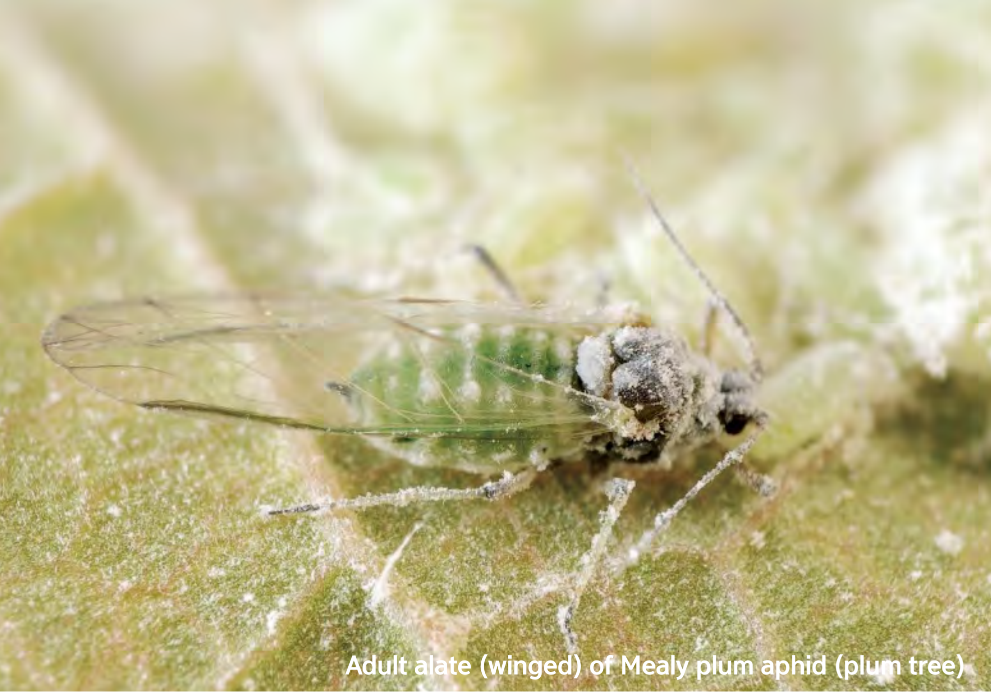
Refer to pages 25, 35~37

JADAM Natural Control Ratio

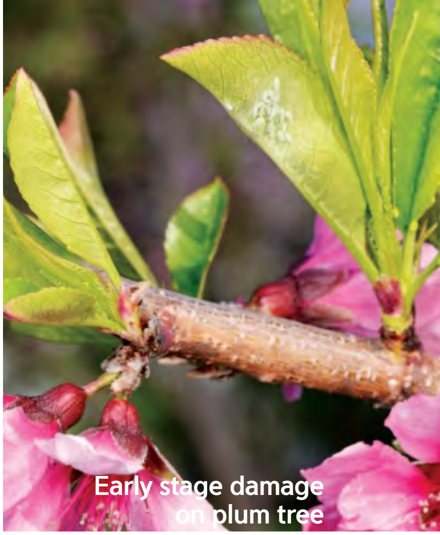
Standard (20L)	**Winter Control**	**Infestation**	**Emergency**
JS	200ml		
JWA	400ml	300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil	80g		60g
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

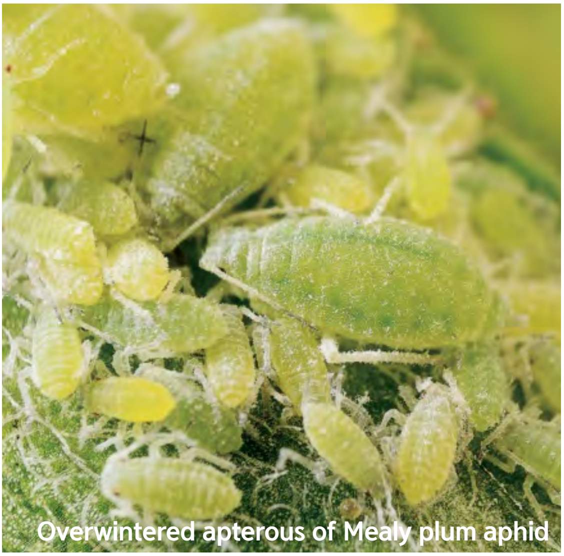
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



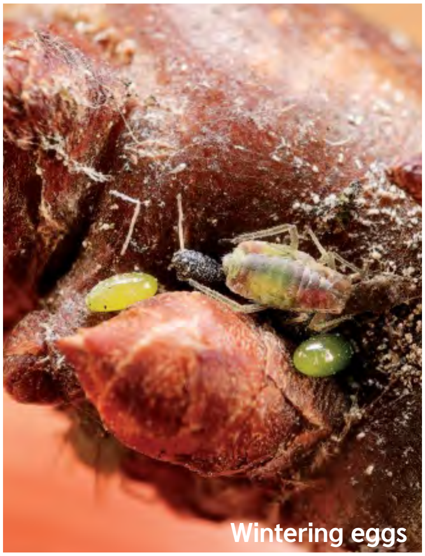
Adult alate (winged) of Mealy plum aphid (plum tree)



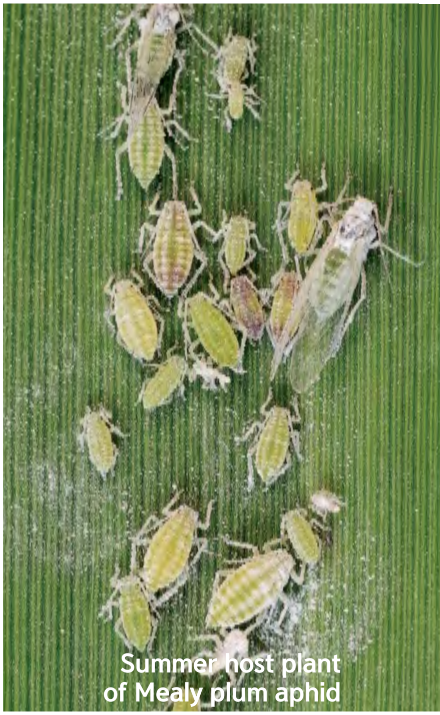
Early stage damage on plum tree



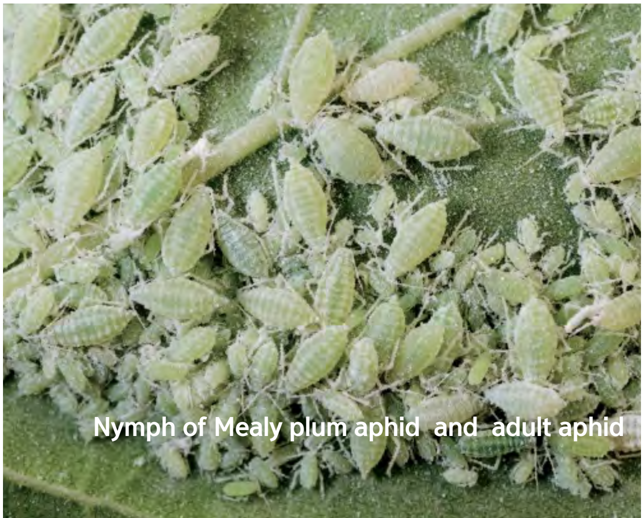
Overwintered apterous of Mealy plum aphid



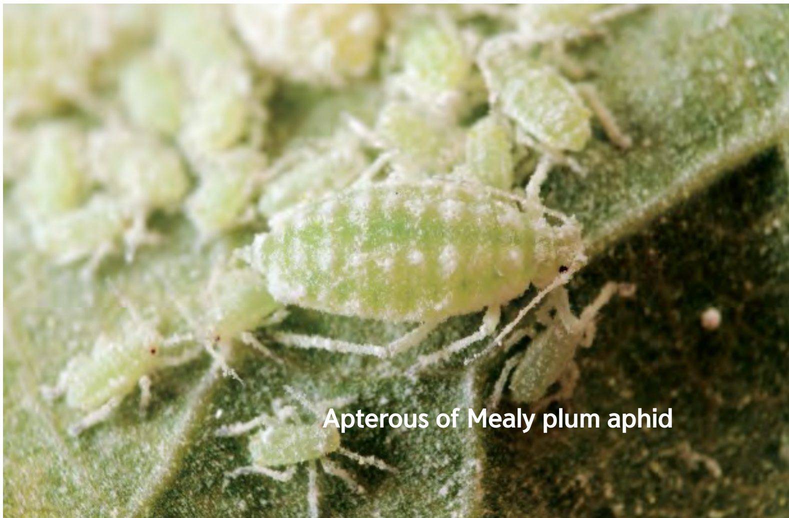
Wintering eggs



Summer host plant of Mealy plum aphid



Nymph of Mealy plum aphid and adult aphid



Apterous of Mealy plum aphid

Green peach aphid

Myzus persicae

Description

Alate (winged) is 2.0~2.5mm and has severe body color variations such as green, light yellow, yellowish-brown, and pink. It is covered with a black pattern from the third abdominal segment's pronotum to the bottom of the cornicle, and there are 2 protrusions on each side of the pattern. The apterous (wingless) are 1.8~2.5mm in length and are light yellow, greenish-yellow, green, pink, and brown, but sometimes they look blackish.

The apterous (wingless) green peach aphids have various body color such as green, red-green, yellow, and yellowish-brown, and their body length is 2~2.5mm. The cornicle is yellowish-brown or blackish brown in a cylinder's shape, and the central part is slightly enlarged. There are black-brown bands and spots on each node on the alate's (winged) dorsal surface, and the body length is 1.8~2.5mm.

Life cycle

They have 9 to 23 generations a year, overwinter as eggs under the snow or peel of peach trees, plums trees (Prunus salicina), and Japanese plum trees (Prunus mume), and hatching in late March to early April when the weather is warmer hatched stem mother begins to reproduce. Then, alate (winged) appear in early mid-May and move to the summer host plant and pass through 6-18 generations, and in mid-late October, they move back to the winter hosts, such as peach and plum trees, and spawning females lay wintering eggs after mating in November.

There are a total 1 to 5 stages of a nymph, the development period is about 10 days, and the female gives birth for an average of 20 days until death. The average life span is 41 days, and the number of births is 75.

Damage

By suctioning the plant's newly emerged leaf fluid of horticultural crops such as vegetable crops, flower crops, and fruit crops, the damaged area stops growing, dries vertically, and atrophies. The damage not only suppresses the growth of shoots but also transmits severe viral diseases.

(National Crop Pest Management System/NCPMS)

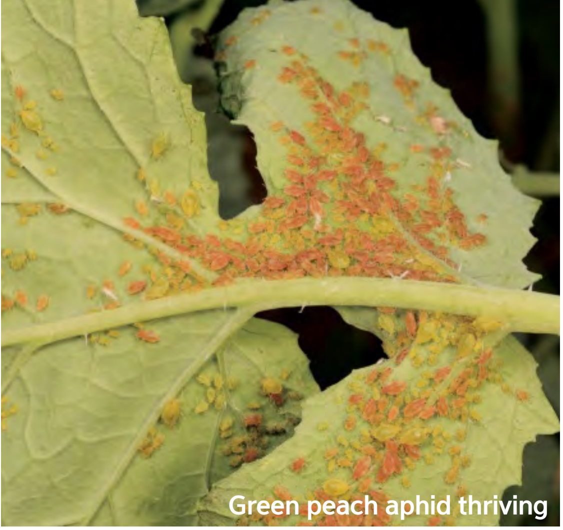
JADAM Natural Control Ratio

Refer to pages 25, 35~37

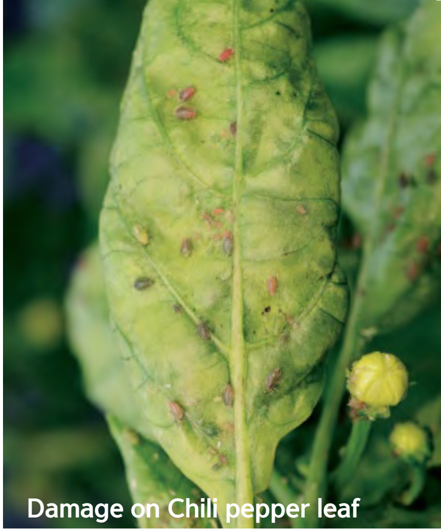
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			60g
Fine soil	80g		60g
Control interval	7days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.
- Remove leaf curling and spray.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.

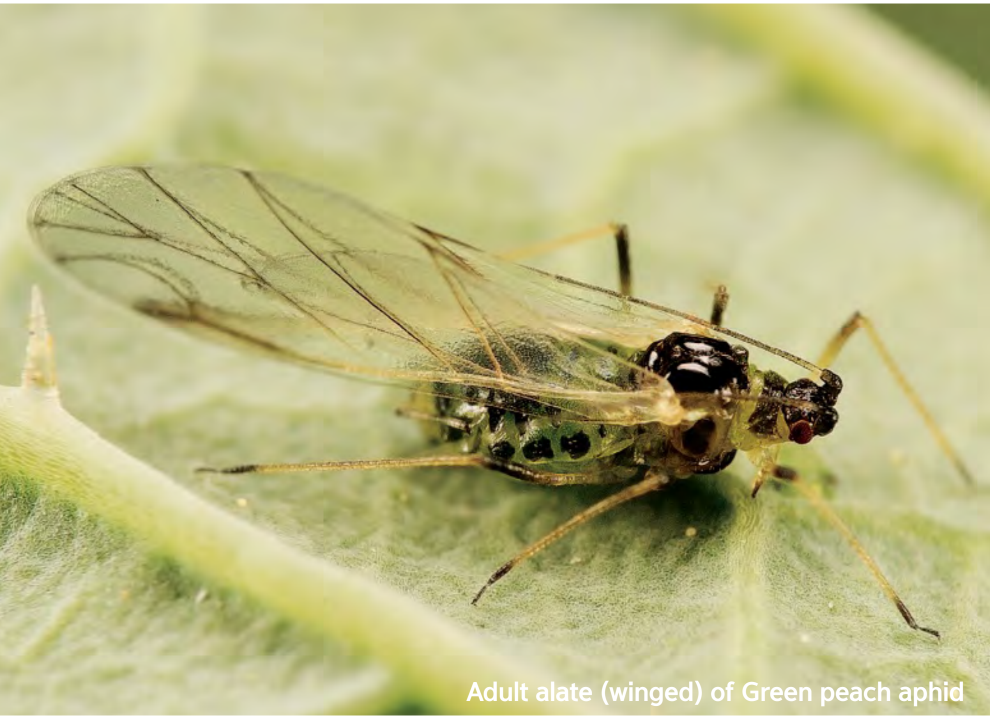
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



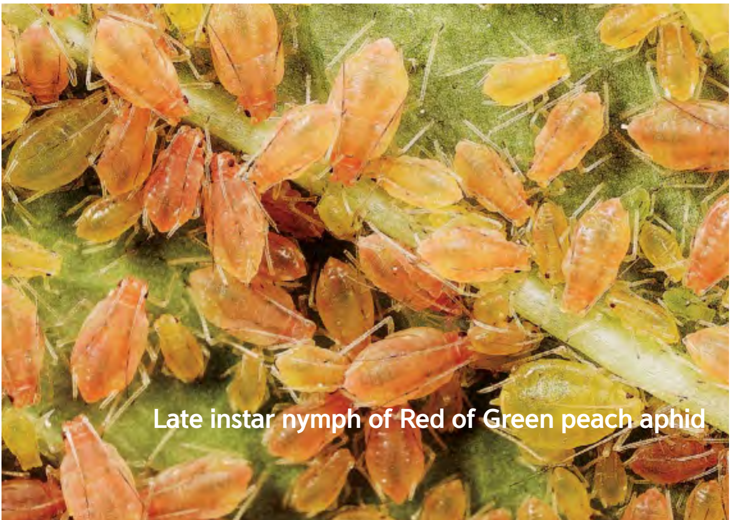
Green peach aphid thriving



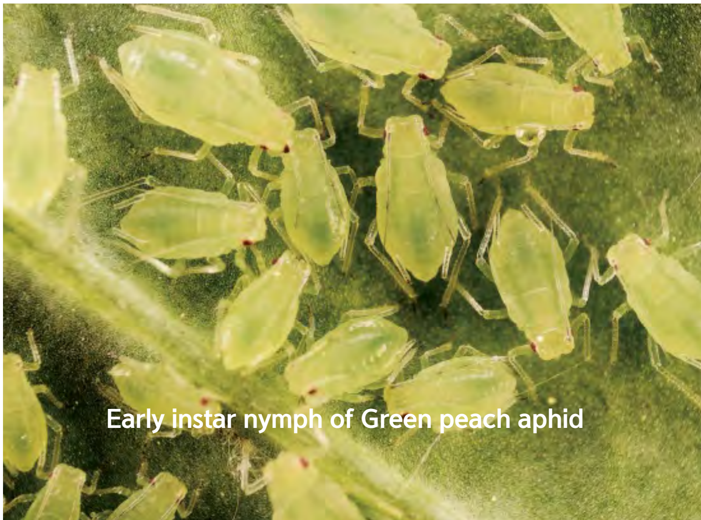
Damage on Chili pepper leaf



Adult alate (winged) of Green peach aphid



Late instar nymph of Red of Green peach aphid



Early instar nymph of Green peach aphid

Wooly apple aphid

Eriosoma lanigerum

Description

Apterous (wingless) are about 2.1mm long, and their whole body is covered with downy white hair. The head is dark green, the antennae are gray, the compound eyes are black, the legs are yellowish-brown, and the abdomen is reddish-brown.

The alate (adult with wings) is about 2.3mm long, 6.3mm long with wings spread, the head is dark brown~black, the compound eyes are black, the antennae are black-purple, and there are 2 pairs of transparent wings.

Life cycle

The nymphs overwinter in cracks of stems, pruning cuts, roots close to the ground, and gaps in lumps caused by harm in summer. They are active from the end of April, becoming an adult in mid-May, and spawns to the next generation.

After that, it continues to multiply and increases in the affected area. It occurs about 10 times a year but usually occurs from June to July to September. When the incidence density increases, the female alate appears then moves to other host plants to propagate.

Causes of significant outbreaks include the destruction of predatory insects due to the spraying of synthetic pyrethroids and the influence of low winter temperature. In general, prevention should start in May, and if the winter is warm, it should be done earlier. Due to the high incidence density, if it occurs on apples, pest control is required.

Damage

From the 10th day of the fall, they inflict the wounded area by covering with white cotton on new buds, small branches, cracks of stems, cuts of branches, and roots near the ground's surface. A small lump is formed in the suctioned area.

(National Crop Pest Management System/NCPMS)

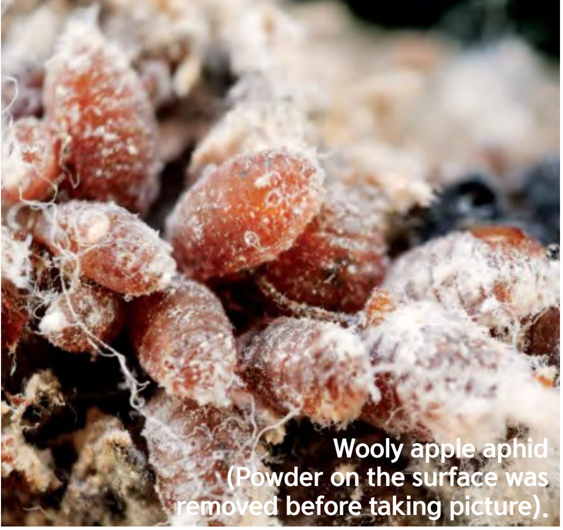
Refer to pages 25, 35~37

JADAM Natural Control Ratio

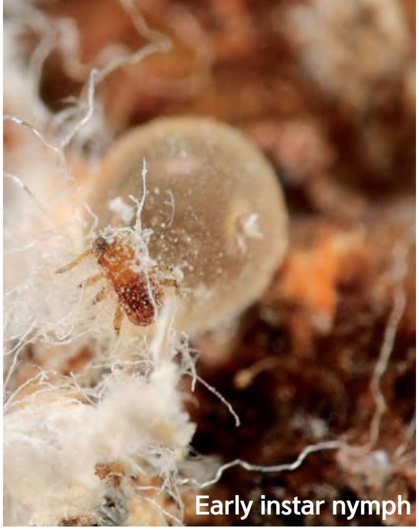
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

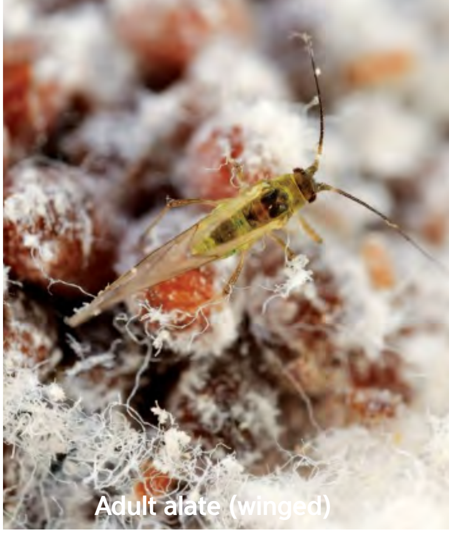
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



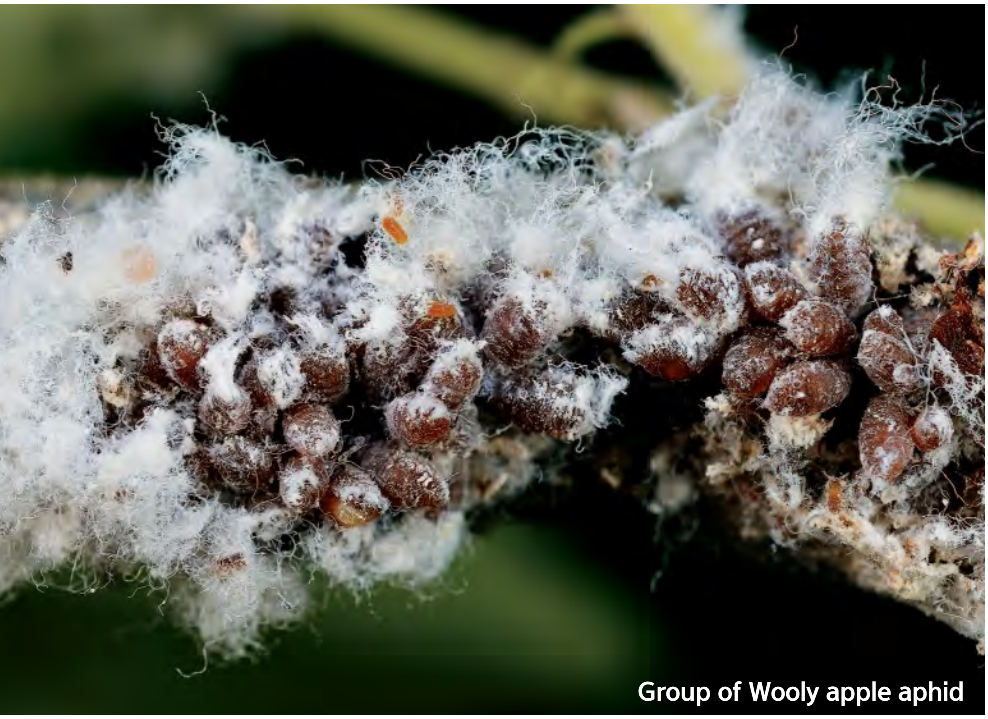
Wooly apple aphid
(Powder on the surface was removed before taking picture).



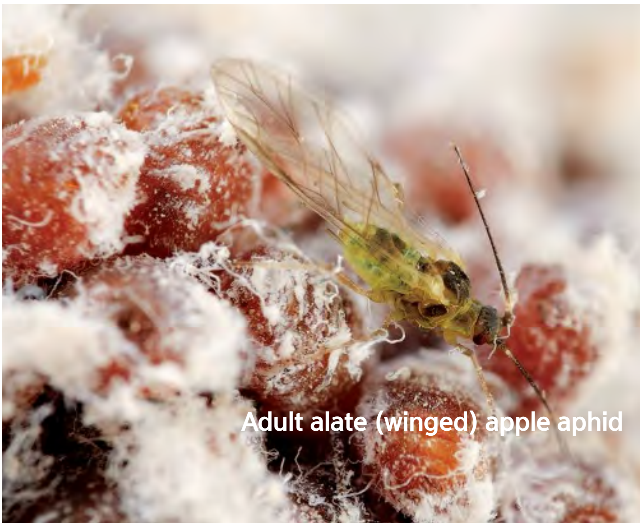
Early instar nymph



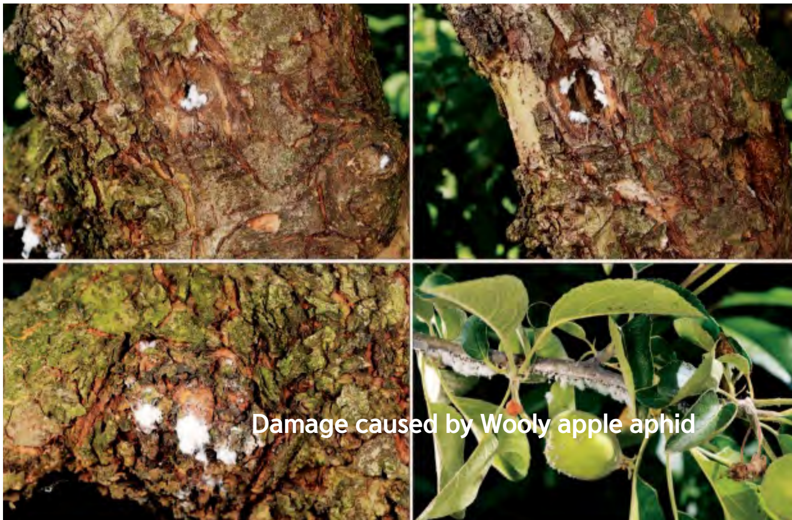
Adult alate (winged)



Group of Wooly apple aphid



Adult alate (winged) apple aphid



Damage caused by Wooly apple aphid

Leaf curling aphid

Myzus malisuctus

Description

The apterous (wingless) is usually dark green or brown, and the alate (winged) type is usually black. The young ones have a lot of light green color, so the variation is vast depending on the individual. And the body is egg-shaped or fusiform, the eggs are glossy, black, and long oval. The body length is 1.5 to 1.7 mm for an adult with wings and 1.3 to 1.7 mm for an adult apterous.

Life cycle

It overwinters with black fusiform eggs on the watershoot of apple trees or on the eye of fisrt and second-year-old branches in winter. It hatches from mid-late March and parasitizes on new buds of the apple tree and radishes.

After that, as the leaves develop, they attack on the leaves' back and soon become an adult called stem mother, which reproduces as a unit and spawns a nymph.

It spawns to nymphs until autumn and repeats generations. Alate (winged) usually appears when the nutrient conditions deteriorate due to increased density, and they disperse to other trees. In mid-October, a spawning female appears, spawning females and males. After mating, they lay wintering eggs near the new and young branches.

Damage

From May to autumn, it inflicts the soft leaves at the tip of the shoots and causing leaves to dry and curl backward. In May, red spots are formed, and the leaves are rolled horizontally toward the rear, but after damaging the mature leaves, the leaves are dried vertically from the leaf edge toward the leaf veins. (National Crop Pest Management System/NCPMS)

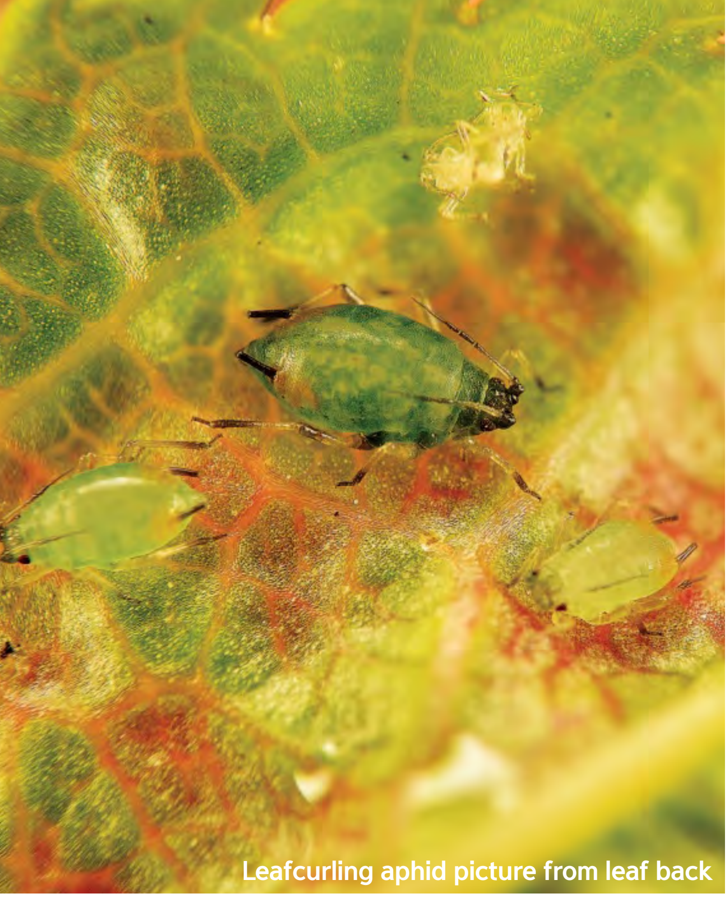
JADAM Natural Control Ratio

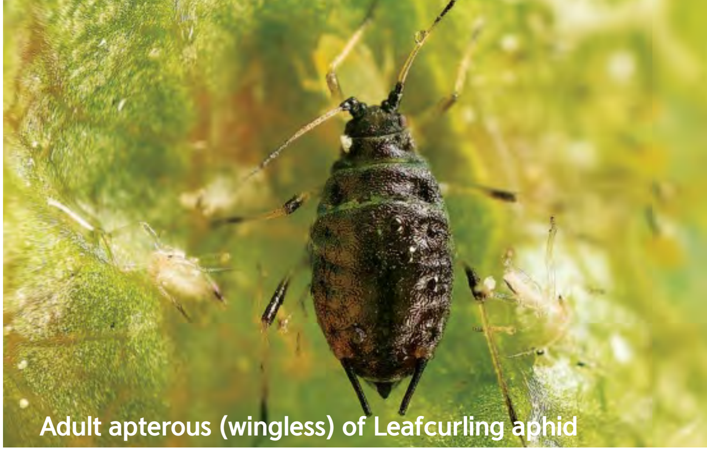
Refer to pages 25, 35~37

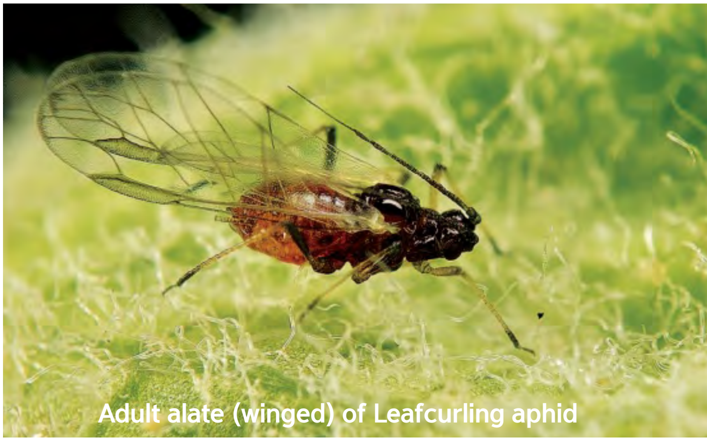
Standard (20L)	**Winter Control**	**Occurrence Time**	**Emergency**
JS	200ml		
JWA	400ml	500ml	700ml
JHS		500ml	700ml
JMS			
NaOH			40g
Fine soil	80g	40g	60g
Control interval	7days	**Visible effect**	3hours

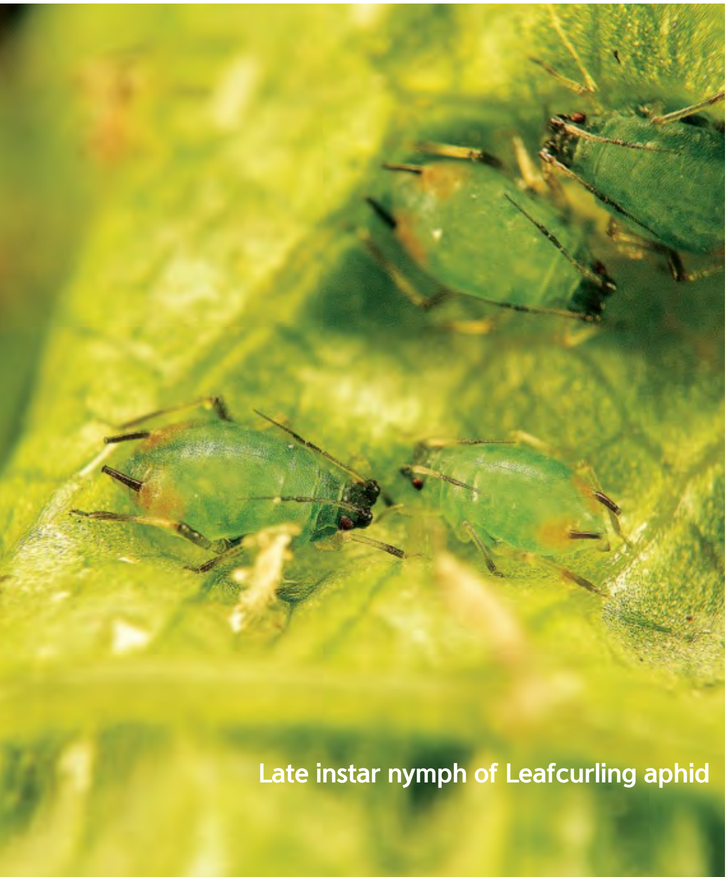
- JADAM solution effectively controls this pest.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.
- Remove leaf curling and spray.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.

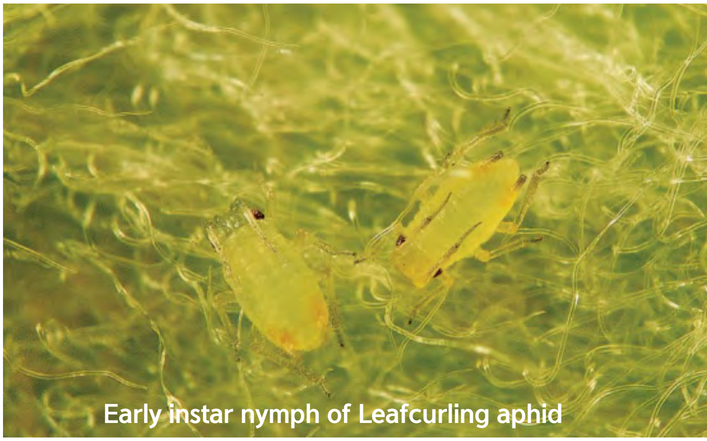
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

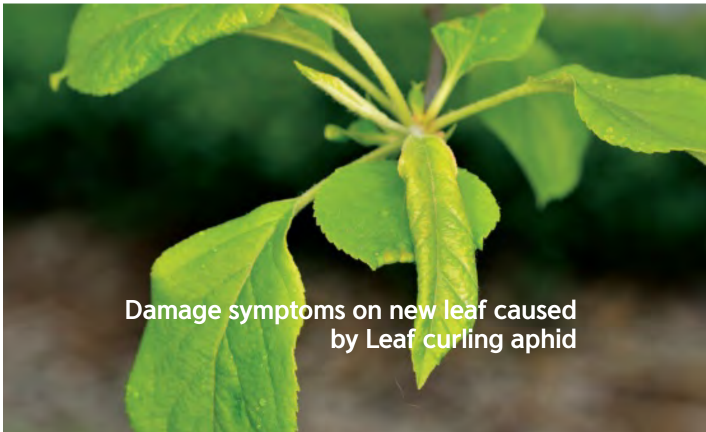

Leafcurling aphid picture from leaf back


Adult apterous (wingless) of Leafcurling aphid


Adult alate (winged) of Leafcurling aphid


Late instar nymph of Leafcurling aphid


Early instar nymph of Leafcurling aphid


Damage symptoms on new leaf caused by Leaf curling aphid

Cowpea aphid

Aphis craccivora

Description

Adults are covered with white beeswax powder with 2-2.3mm, but there are cases where they are glossy. The cornicle has a black circular column shape. The nymph is yellowish-brown and is often covered in white powder.

Life cycle

It is a common species distributed worldwide, it is a famous pest of legume crops as it has a good breeding season coinciding with the growing season of legumes. In spring, it starts to occur on the sprout and moves to another host.

Adult insects and nymphs occur from spring to autumn and generally overwinter and multiply as female adult insects. The body is mostly black, a net pattern is clear on the abdomen. It is similar to the cotton aphid (Aphis gossypii). It occurs in many host plants, such as false acacia tree, Alyce clover, Kudzu vine, Chinese pea tree (Caragana sinica), Tangerine, Jujube, Hibiscus, Forsythia, Japanese sumac (Rhus javanica L.), Soybeans, Peas, Peanuts, Chinese cabbage, and Peppermint.

Damage

The adult insects and nymphs form a group on new sprout and seedlings to begin to suck sap (fluid) of the plant. It delays the growth of plants and causes soot disease by secretions. In many cases, while living in the shoots, the damaged tip is atrophied, and development is hindered by suction.

(National Crop Pest Management System/NCPMS)

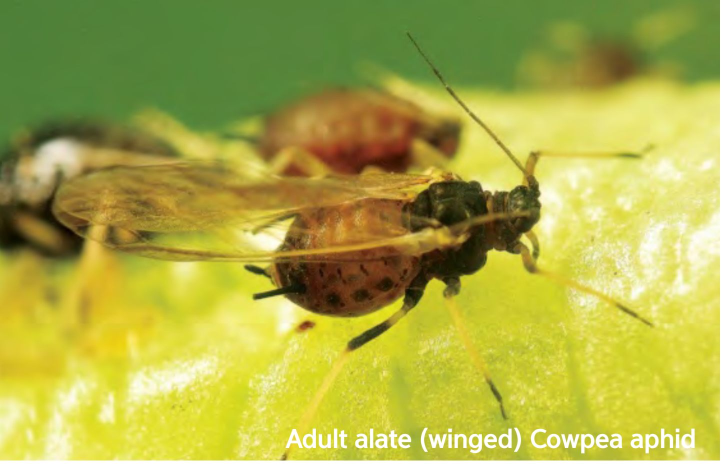
Refer to pages 25, 35~37

JADAM Natural Control Ratio

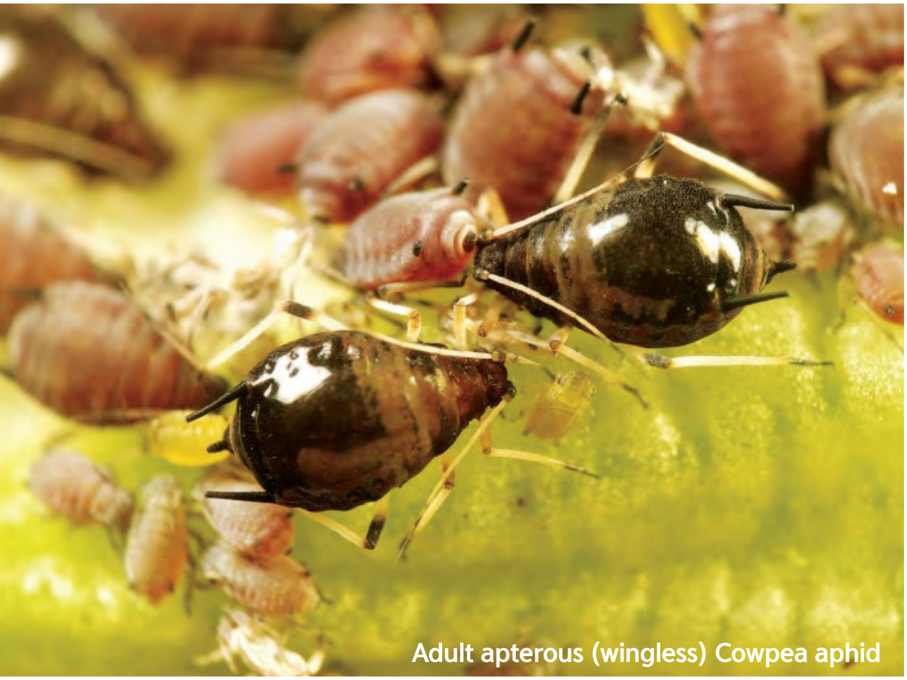
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			60g
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

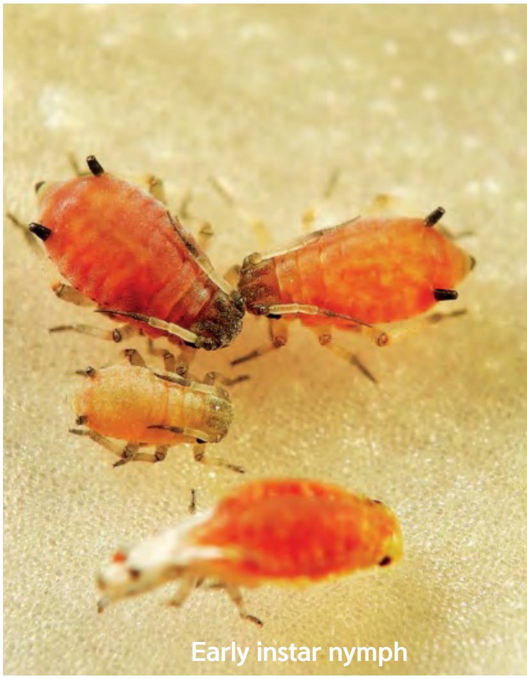
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



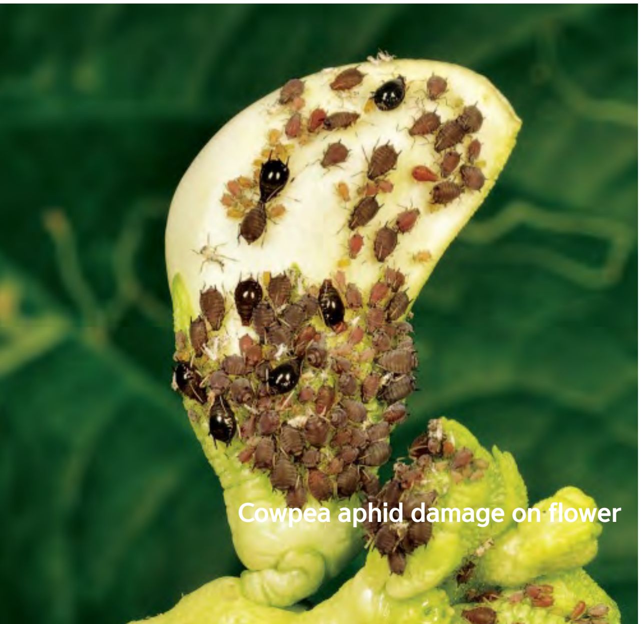
Adult alate (winged) Cowpea aphid



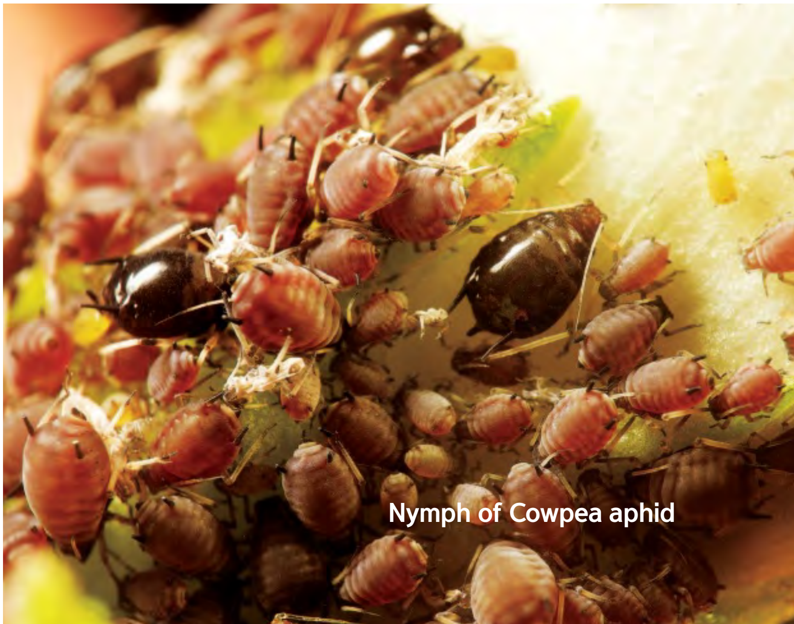
Adult apterous (wingless) Cowpea aphid



Early instar nymph



Cowpea aphid damage on flower



Nymph of Cowpea aphid

Cabbage aphid

Brevicoryne brassicae

Description

The alate (winged) is 2.2mm, dark green, and the body's surface is covered with white powder. There are 6 black bands on the back, and the lateral skin plate is black. The central part of the cornicle is convex and has a rim.

The body color of the apterous (wingless) is gray-green. The black pattern is two rows from the front thorax back to the end of the abdomen, and the left and right ones are gathered together in the rear three nodes to form a lump. The cornicle is short, the central part is slightly convex, and there are several horizontal lines and rims near the end. They occur more in autumn than in spring.

Life cycle

It is a pest that occurs in cabbage family plants, and they form a group to causes damage. The aphid lives year-round on the leaves of the Cabbage family plant and occurs in spring. The parasitized plant looks white, as if it was covered with flour.

One aphid spawns about 40 offspring, the life span of adult insects is 30 days, and the period of insects is 7-12 days. Eggs hatch at 7~8℃, and the optimum temperature is 25~26℃, and the optimum humidity is 60~70%. It is difficult to observe with the naked eye because it winters between the gaps in the soil surface's and leaves.

Damage

When the density increases in early spring after winter, they gradually attach to the leaf's back, forming deformation of the leaves by suctioning, reducing product value by damaging due to the induction of soot disease. In autumn, it attaches to the stem, where seeds are formed.

(National Crop Pest Management System/NCPMS)

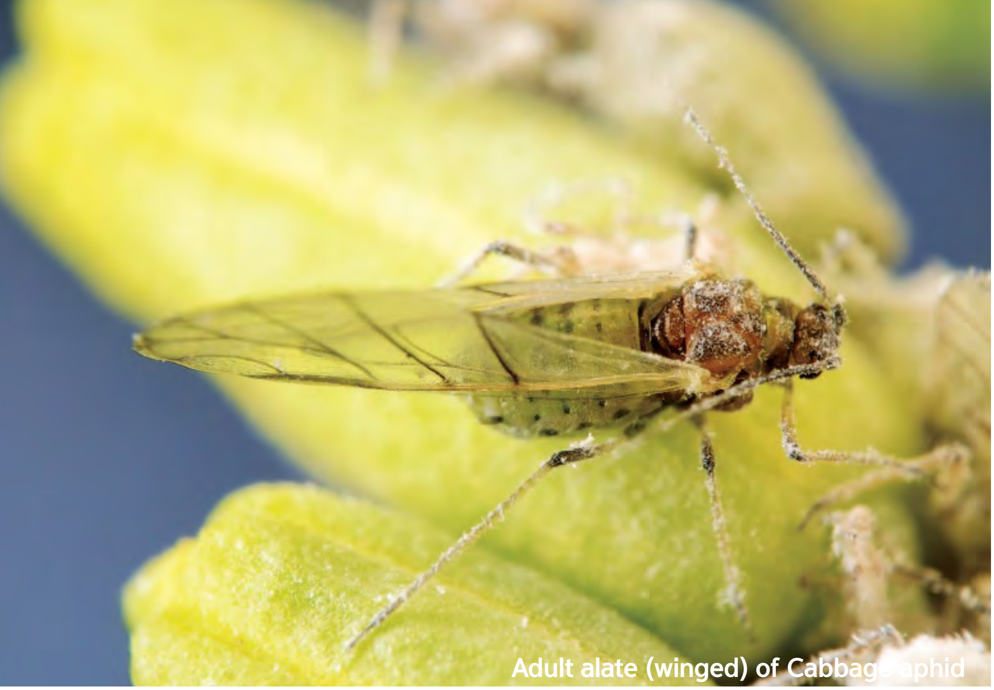
Refer to pages 25, 35~37

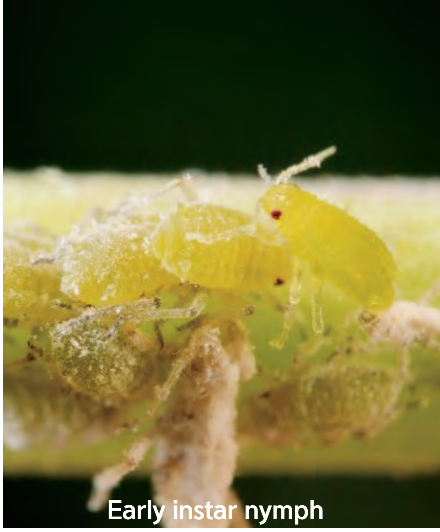
JADAM Natural Control Ratio

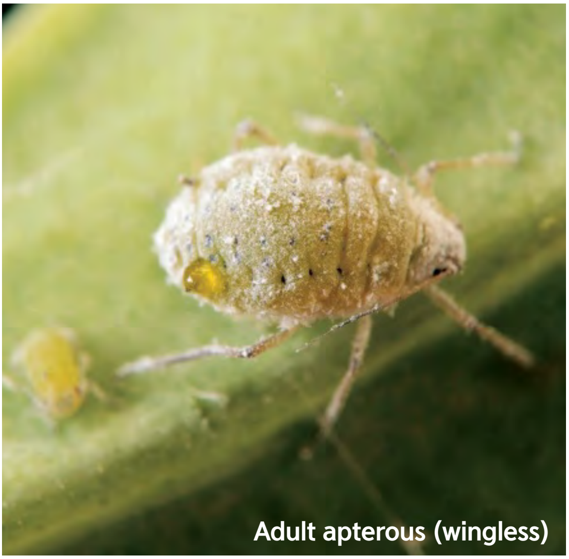
Standard (20L)	Prevention	Infestation	Emergency
JS			50ml
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			60g
Control interval	7days	**Visible effect**	3hours

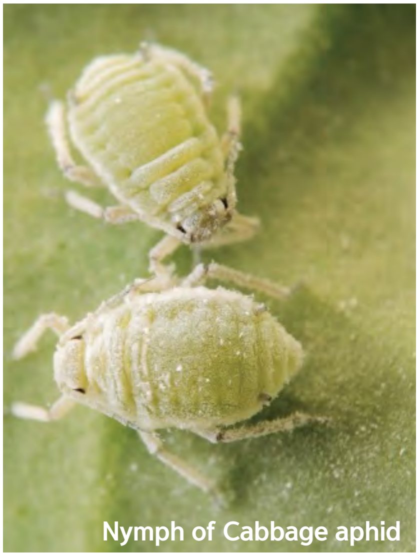
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

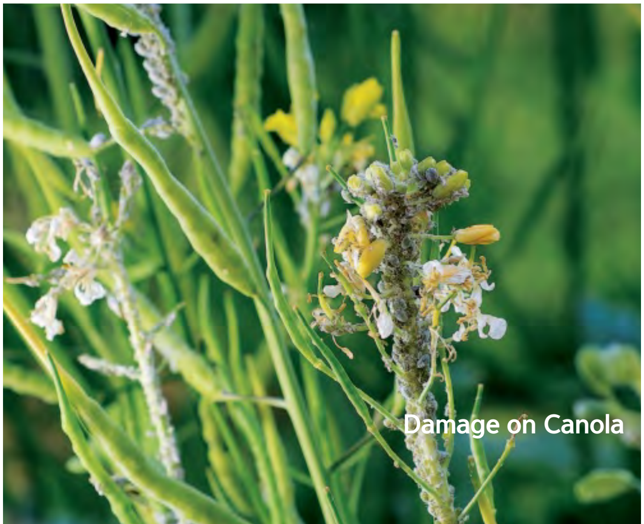
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

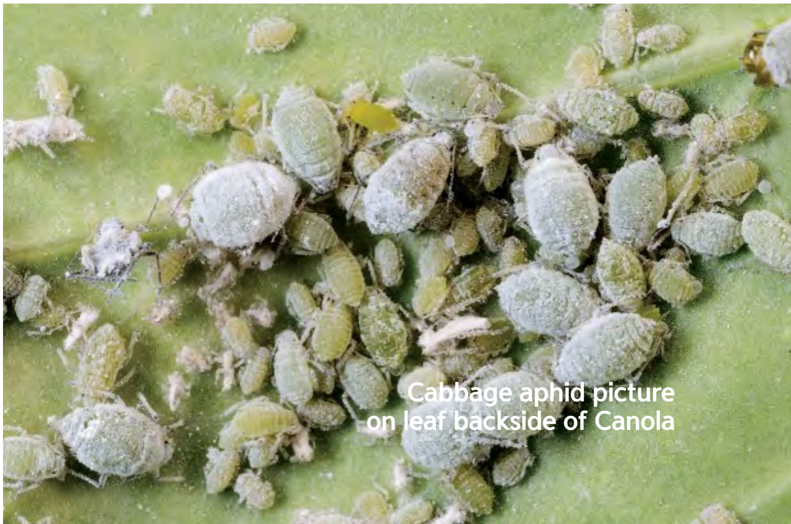

Adult alate (winged) of Cabbage aphid


Early instar nymph


Adult apterous (wingless)


Nymph of Cabbage aphid


Damage on Canola


Cabbage aphid picture on leaf backside of Canola

Corn leaf aphid

Rhopalosiphum maidis

Description

The body length alate (winged) is about 2.1mm, and about 2.4mm for apterous (wingless). The color of the body is generally blackish green. The alate head is black, its compound eyes are dark red, and its antenna (tactile sensor) is also black. There are 3 dark lateral patterns on both sides of the abdominal tergum, the cornicle is black, the tip is black green, and the endplate is dark green or black-green.

Legs are also light-colored at the bottom of the thigh and the rest are black. There is a small forehead on the head. Antennae are divided into 6 segments and 17~29 small round secondary sensors irregularly scattered on the 3rd antennae segment. The fourth antennae segment has 2-14, the fifth antennae segment has 1-4 secondary sensors, and the antennae length is about 1.5mm. The body is elongated. The lateral process is on both sides of the pronotum and the fisrt and seventh abdominal segments. There are small ones on both side patterns of the second-fifth abdominal segments, respectively.

The cornicle is cylindrical and has a scale pattern at the end. The calf segment of the leg is black, and the tip is very thin so that it can be easily distinguished from other species. The tip piece is conical, the central part is narrow, and 4 setae are arranged on both sides, and the scale pattern is distinct. There are 15~21 hairs on the base.

The head is black-green, and the compound eyes are dark red. The antennae is dark, but the lower half of the third segment is light-colored. The cornicle, the tip piece, and the endplate are black, and the legs are generally black. There is a small forehead in the head, and there is no secondary sensor in the antennae. The body is elongated, and there is a net pattern on the back of the thorax and abdomen, and the lateral process is located on both sides of the pronotum and the fisrt and seventh abdominal segments. The cornicle is cylindrical, but the central part is slightly constricted, and there are 11-17 setae on the bottom plate. (Doosan Encyclopedia)

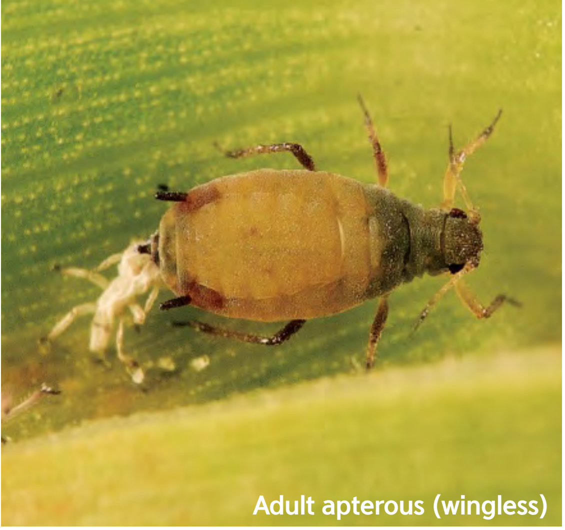
JADAM Natural Control Ratio

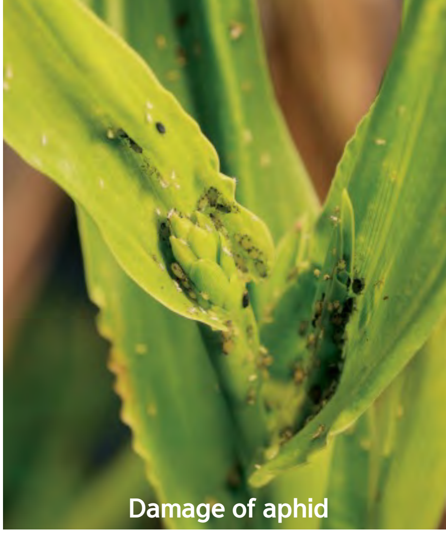
Refer to pages 25, 35~37

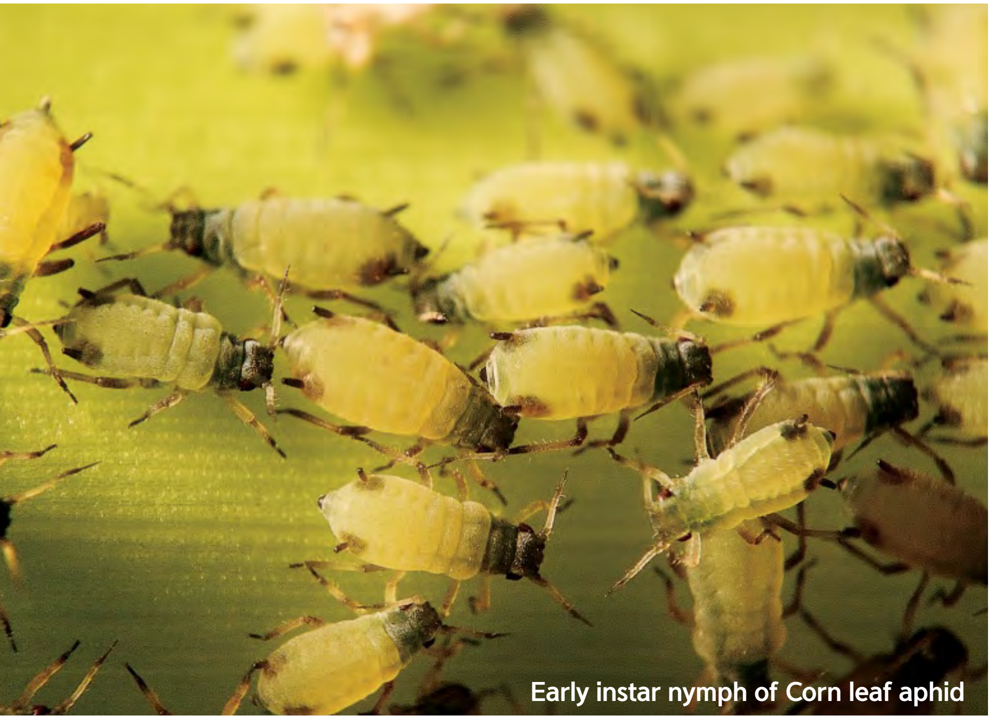
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200ml	400ml
JHS		200ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	Visible effect	3hours

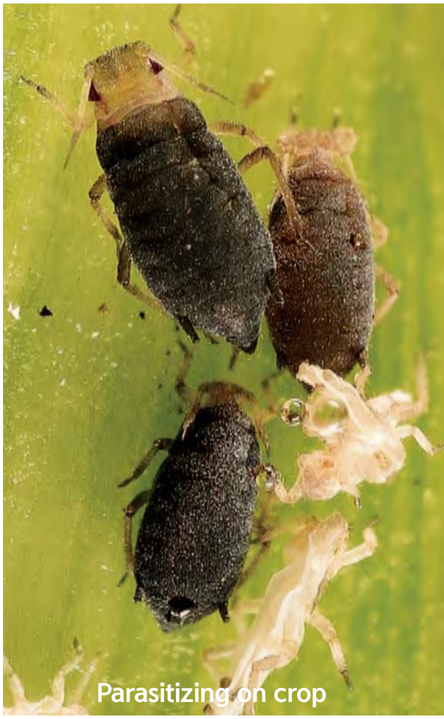
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

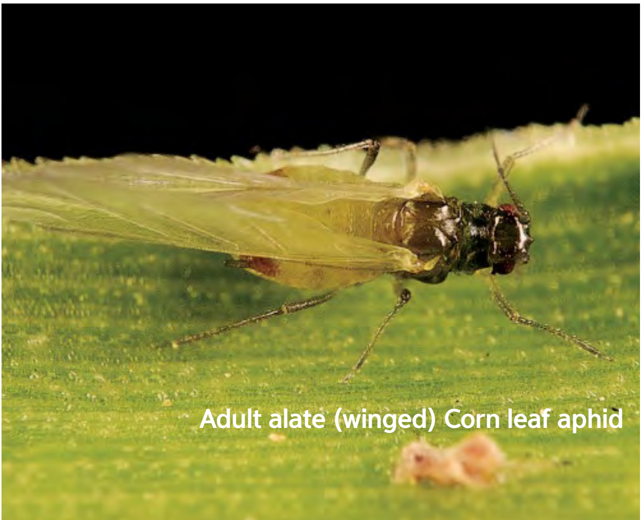
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

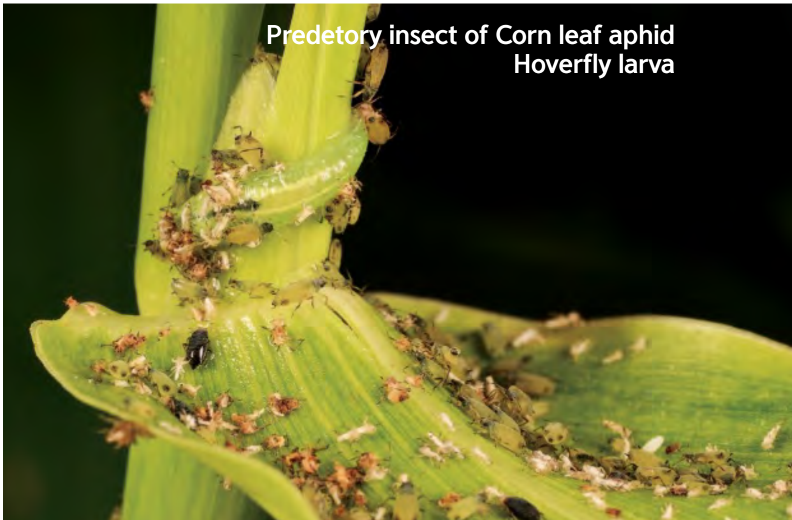

Adult apterous (wingless)


Damage of aphid


Early instar nymph of Corn leaf aphid


Parasitizing on crop


Adult alate (winged) Corn leaf aphid


Predetory insect of Corn leaf aphid
Hoverfly larva

Pea aphid

Acyrthosiphon pisum

Description

The body length of alate (winged) is about 3.6mm, and apterous (wingless) is approximately 3.8mm, which is large. The shape of alate is similar to apterous, but the head and thorax are light brown, and there are faint lateral patterns on both sides of the abdomen. The antenna (tactile sensor) is in 6 segments long, and dark black.13 to 23 secondary sensors are lined up on the third antennal segment. The cornicle has a long cylindrical shape, and the tip is black. The end-piece is a long conical shape and has 4 setae on each side.

Some insects are entirely green, covered with gray waxy powder, and sometimes red. Antennae are light brown, legs are green, and only the tip of the calf is black. The cornicle is also brown at the tip and is slightly longer than that of the alate. The forehead of the head is clear and smooth. Since there is no middle forehead, the front edge of the central part forms a U shape. The inside of the fisrt and second antennal segments is rough. There are 1-5 secondary sensor organs on the 3rd antennal segment. The cornicle is thin and long, about a quarter of the body length. The tip piece has a sharp tip and has 8 to 13 long setae.

Life cycle

It is parasitic on legumes and is widely known as a pest of peas. It overwinters in the host plant as an egg or female apterous;it proliferates at once causing damage when it gets warmer. It moves to beans in summer and returns to peas in autumn. The alate occur in early summer.

Damage

It forms a group on the backside of young leaves near the growth point, and it sucks the sap (fluid of plant), which interferes with growth. The pods will atrophy and stop growing if it is parasitized. In the greenhouse, it multiplies even in winter, causing soot disease dirtying the leaves. In general, there are many cases parasitism begins along with early sowing and around the time the fertilizer effect appears. (Doosan Encyclopedia)

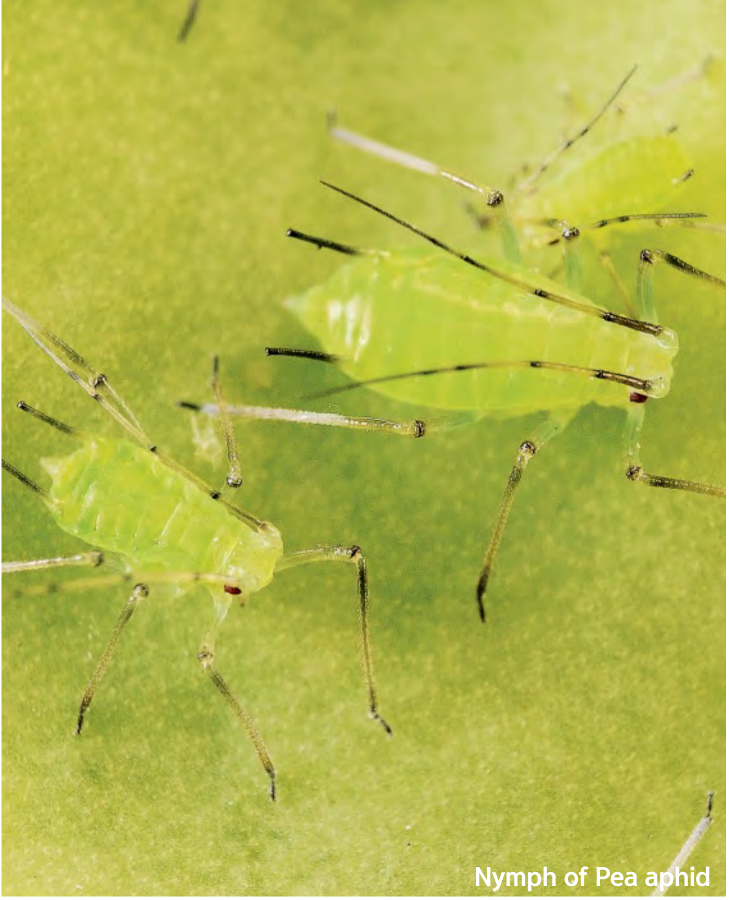
JADAM Natural Control Ratio

Refer to pages 25, 35~37

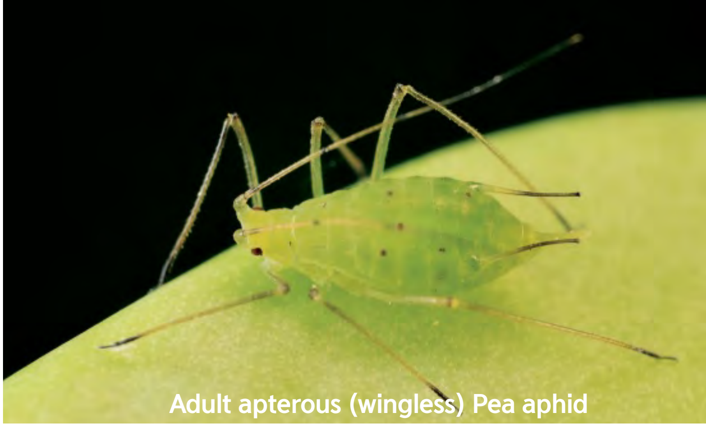
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	400ml
JHS		300ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	10days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

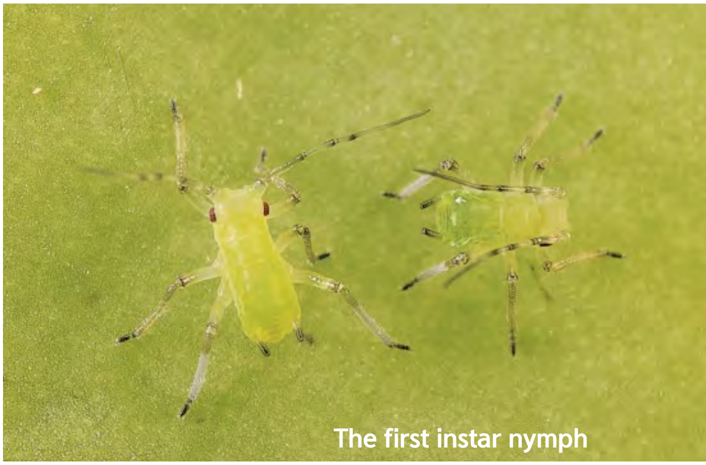
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



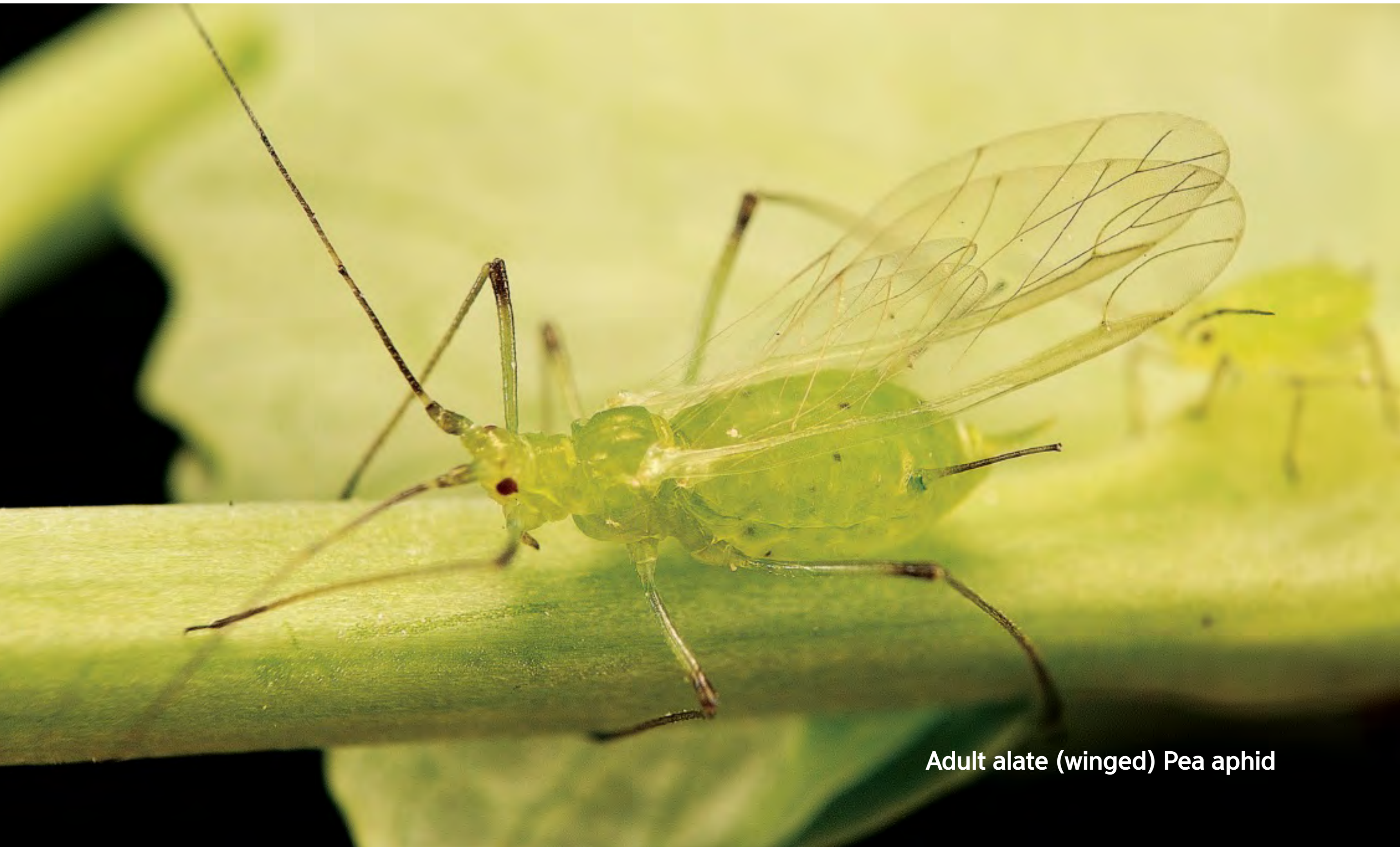
Nymph of Pea aphid



Adult apterous (wingless) Pea aphid



The first instar nymph



Adult alate (winged) Pea aphid

Siprea Aphid

Aphis spiraecola

Description

Apterous (wingless) is 1.2~1.8mm, and their head is dark. The abdomen is yellow-green, and the upper and lower limbs are black. The alate (winged) has a black head and thorax and a yellow-green abdomen.

The lower part of the cornicle and the side of the abdomen is dark. Eggs are initially green, but after 2-3 days, they turn glossy black. Alate nymphs are yellow or green, and their head and thorax are dark brown, but their body color varies according to season. The apterous is 1.2~1.7mm, the head is dark, and the body is yellow or green.

Life cycle

They have about 10 generations a year, and overwinter with black oval eggs in the snow, apple, watershoot of the radish, or on the shoot of 1 to 2 years old branches. In April, the eggs hatch and grow as a stem mother unit and increase apterous density (wingless). When an individual's density increases, alate (winged) develops in early May and scatter to the entire apple tree. These individuals mainly occur in May and June, and in particular, they reach their peak between mid-May and mid-June. At this time, it irritates humans during the fruit bagging process. Conditions that are prone to population growth are prolonged after the end of May when the temperature is low, and the humidity is high and the occurrence period becomes longer, and if it is the opposite, the occurrence decreases. Also, if the shoots grow late in the fall, the later occurrence increases.

Damage

It damages the behind of leaves, causes decrease in growth by suctioning the new leaves of potato, tomato, vegetable, and fruit trees, including bridal wreath (Spiraea prunifolia) Gardenia fruit (Gardenia jasminoides), and flowers.

(National Crop Pest Management System/NCPMS)

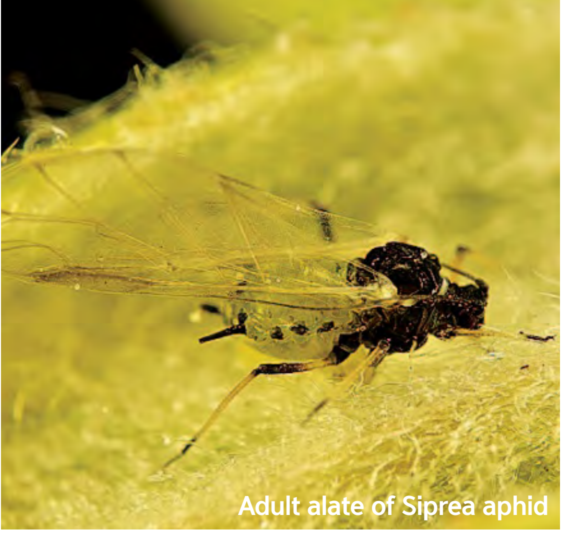
JADAM Natural Control Ratio

Refer to pages 25, 35~37

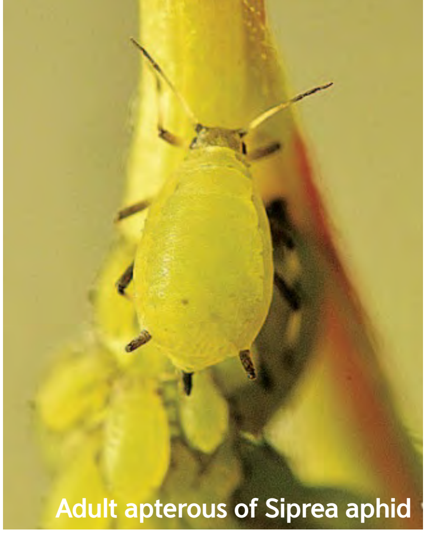
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	700ml
JHS		500ml	700ml
JMS			
NaOH			40g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

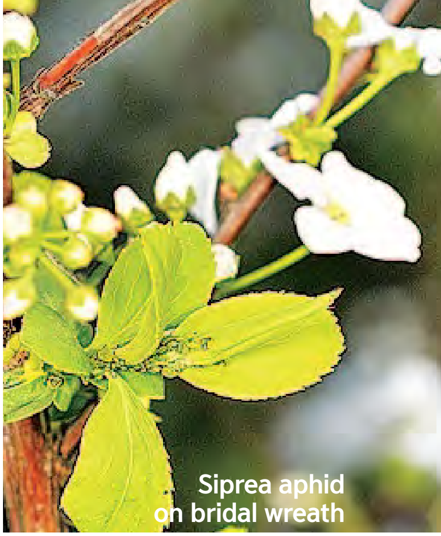
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



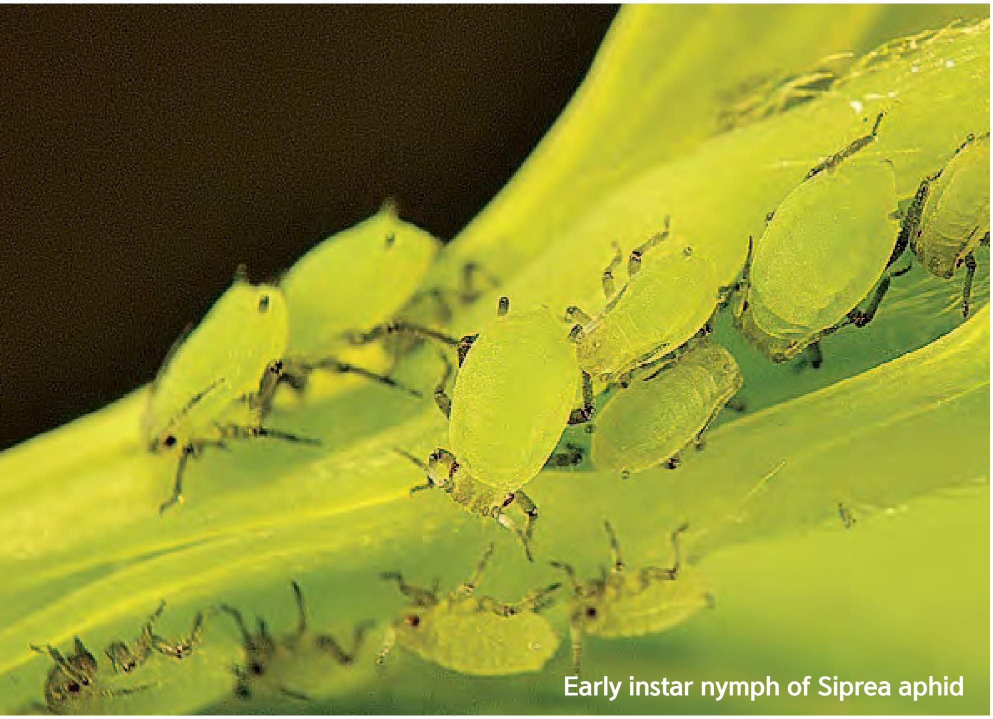
Adult alate of Siprea aphid



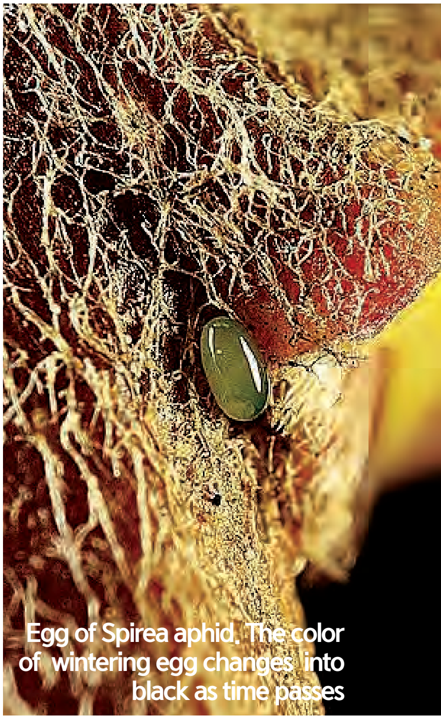
Adult apterous of Siprea aphid



Siprea aphid
on bridal wreath

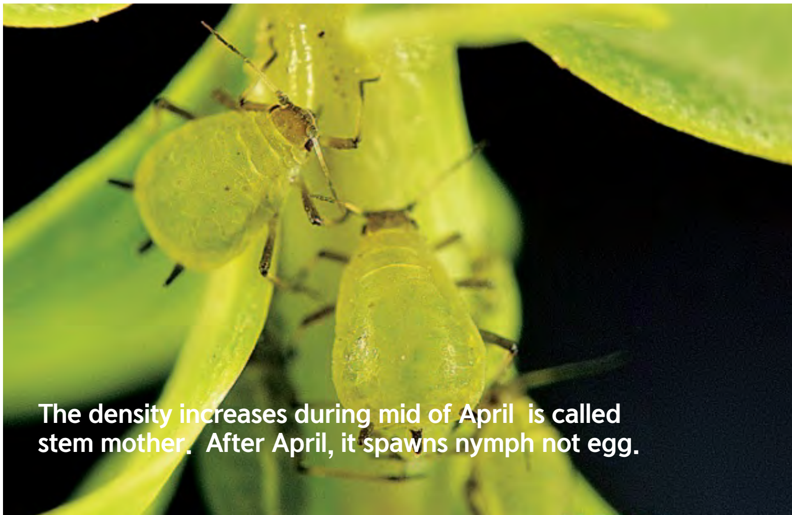


Early instar nymph of Siprea aphid



Egg of Spirea aphid. The color of wintering egg changes into black as time passes

Occurance of Siprea aphid
on the new shoot of apple tree



The density increases during mid of April is called stem mother. After April, it spawns nymph not egg.

Rose aphid

Sitobion ibarae

Description

The alate (winged) body length is about 3.1mm and approximately 3.4mm for apterous (wingless). Adult apterous is larger in size than other aphids and has a green color. The anterior and middle thorax are green-orange red, and the abdomen is yellow-green-green. The thorax and the front of the abdomen are often dark brown.

The antennae are black, and the legs are yellow-green. The adult alate has a yellow-red head and thorax, and the abdomen is bright green. The body is slightly smaller than that of the adult apterous and has a developed thick plate on both sides of the abdomen.

Life cycle

They mainly lives on roses. In cold regions, they overwinters as eggs, and in warm regions, they overwinters as adults or nymphs. When a new leaf emerges, they begins to multiply. They are most common in April to May in the open field, decreases in midsummer, increases again in autumn, and inflicts the summer host plant without moving to other host plants throughout the year.

In the greenhouse, breeding continues till winter. Population growth can be detected in the center of newly emerged branches. Install yellow sticky traps on the top of the plant at intervals of 5 to 10m, or install yellow sticky traps near the pavement to investigate adult aphid with flying wings. It is wise to reschedule control date when predatory insects are found.

Damage

Around April-May, it lives in sprouts and buds to suck rose's sap (fluid). And inhibits shoot growth, causes deformation of the leaf, and slows development. It collectively parasitizes on branches that grow on briers and roses. There are also other species damaging rose, such as green peach aphids.

(National Crop Pest Management System/NCPMS)

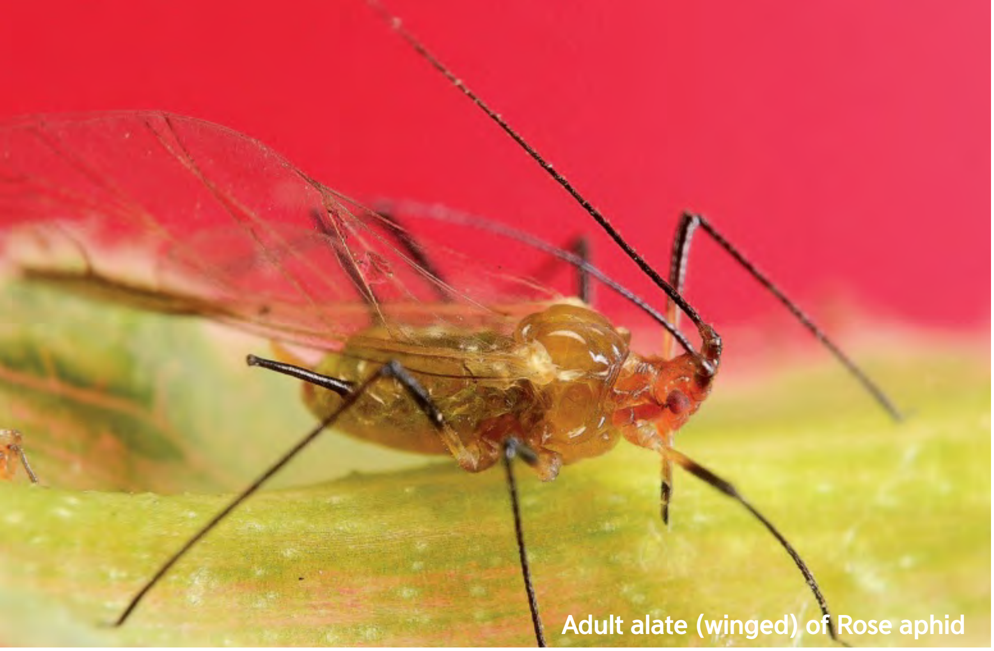
Refer to pages 25, 35~37

JADAM Natural Control Ratio

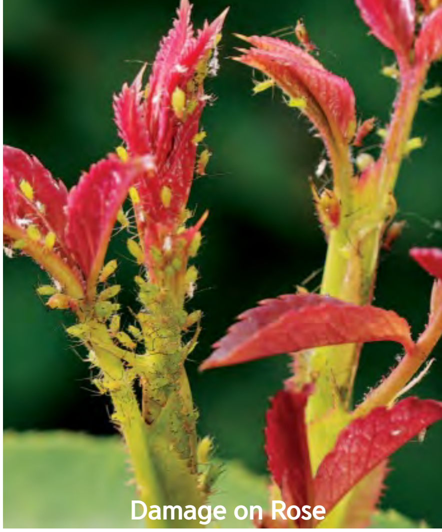
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

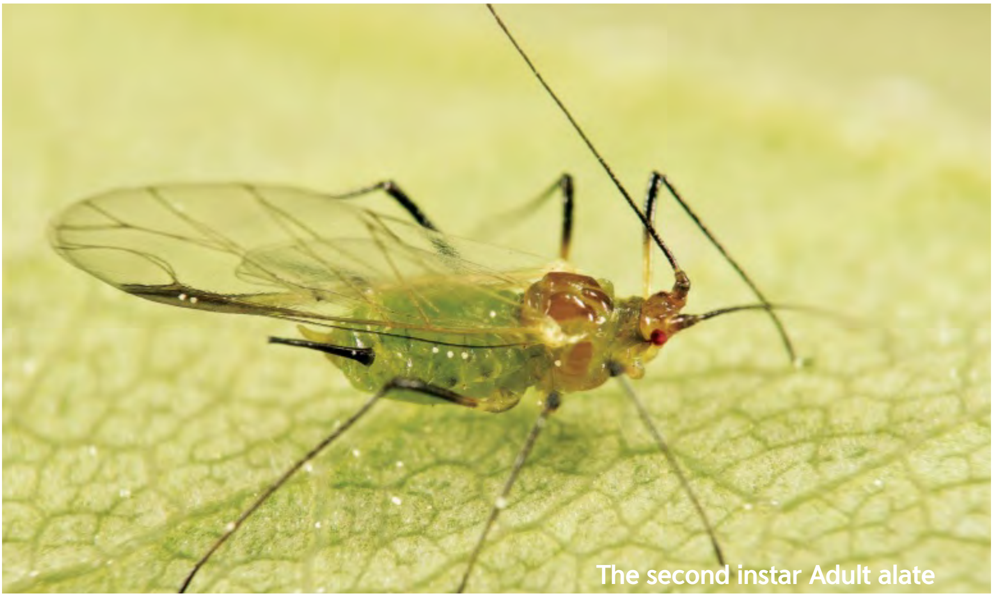
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



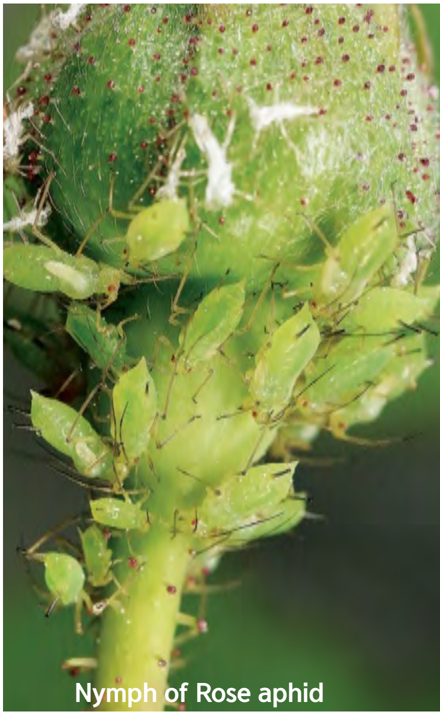
Adult alate (winged) of Rose aphid



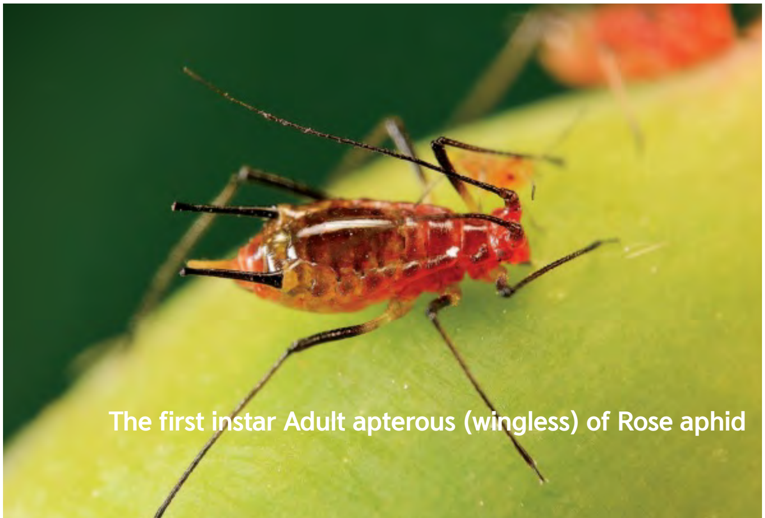
Damage on Rose



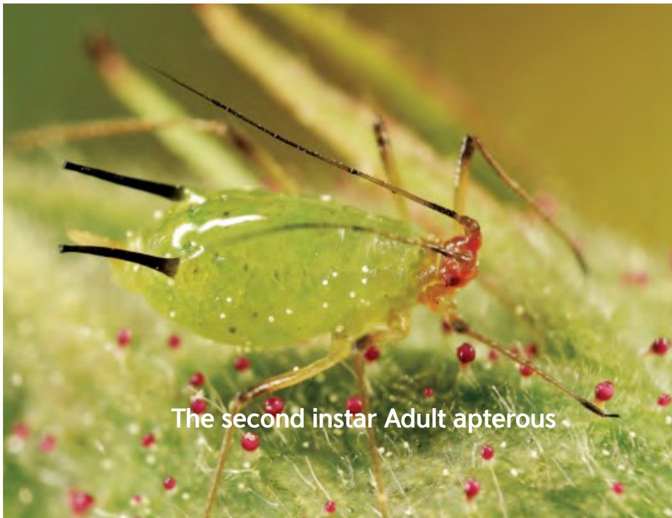
The second instar Adult alate



Nymph of Rose aphid



The first instar Adult apterous (wingless) of Rose aphid



The second instar Adult apterous

Uroleucon fuchuense

Description

The apterous (wingless) body is reddish-brown, and the forehead is developed on the head, and the inside is almost straight, facing outward, and there are 3 long setaes. Skin scabs are lined up on the back of the abdomen. The cornicle is in the shape of a cylinder that hangs toward the end and has a net pattern. The length is 3.82mm.
(Korea National Arboretum)

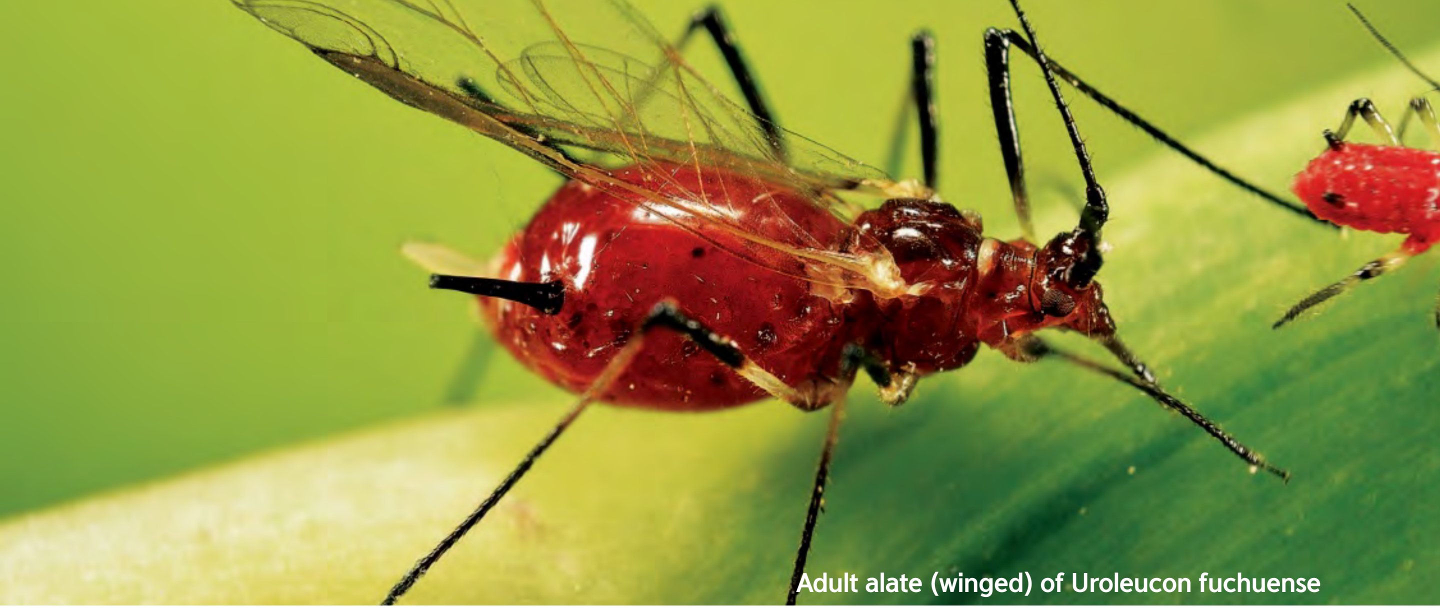
Refer to pages 25, 35~37

JADAM Natural Control Ratio

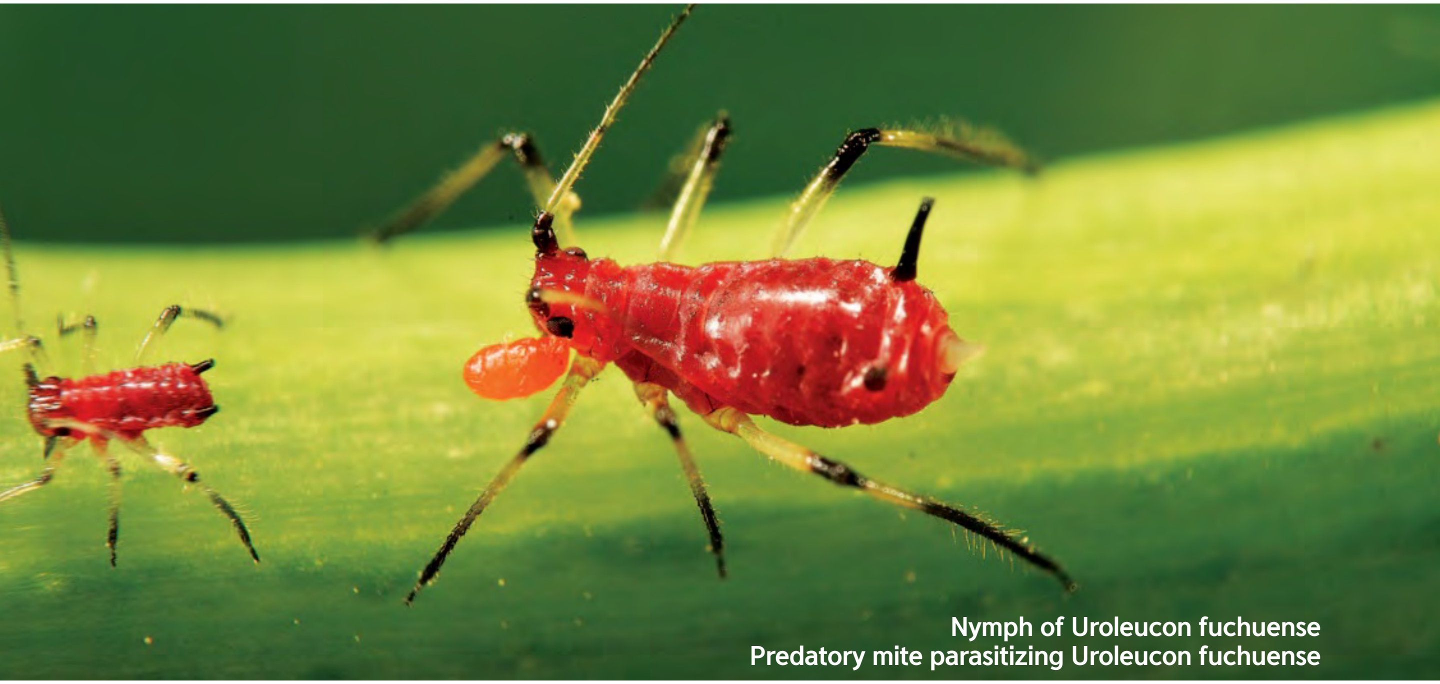
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

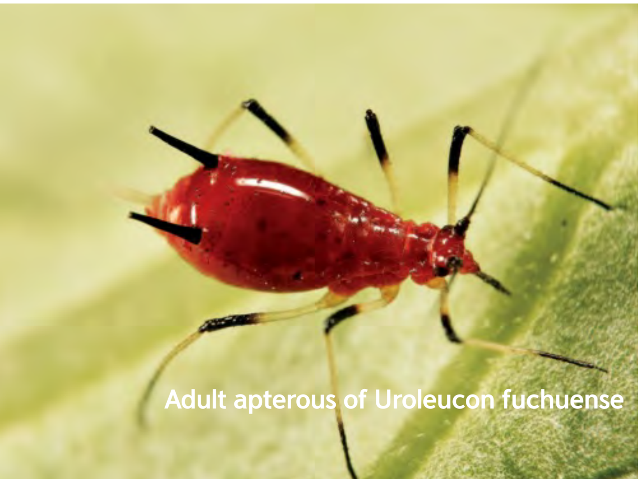
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



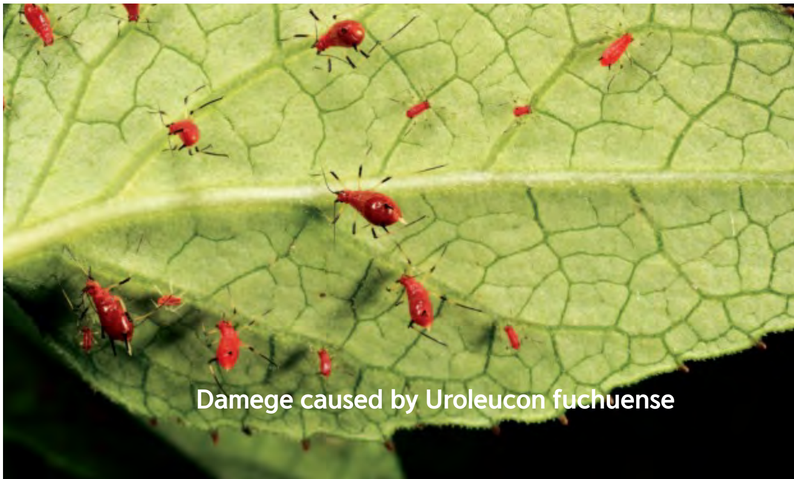
Adult alate (winged) of Uroleucon fuchuense



Nymph of Uroleucon fuchuense
Predatory mite parasitizing Uroleucon fuchuense



Adult apterous of Uroleucon fuchuense



Damege caused by Uroleucon fuchuense

Soybean aphid

Aphis glycines

Description

The alate body length is 1.6mm, which is relatively small, and its head is black, and its eyes are red. The color of the body is yellow, and the cornicle is 0.24mm, shorter than the tip of the antenna (tactile sensor), and is cylindrical in black.

Life cycle

It occurs 10 to 15 times a year, and its primary summer host plant is soybean and other legumes. Eggs overwinter from the roots of the winter host, then hatches as a stem mother in spring of the following year, then fly to the soybean fields by the end of June. They start to grow and show the highest density in mid-July, and the incidence decreases in the latter half of the year.

It is the most common aphid that occurs on beans. The Origin of Soybean aphid is from the Korean peninsula and occurs nationwide all over Korea, but the damage is not significant. It often occurs when drought persists.

Damage

It sucks the sap of crops while living on the behind of bean leaves or young leaves and stems near the growing point. If the leaves are wilted, and the young pods are damaged, the beans cannot grow. The damage is particularly severe in the mountainous areas where there are many Japanese chaff flowers (Achyranthes japonica), which are winter hosts.

In severe cases, the nectar produced by aphids inhibits the growth and blocks photosynthesis secondarily. Also, it delivers various viral diseases. (National Crop Pest Management System/NCPMS)

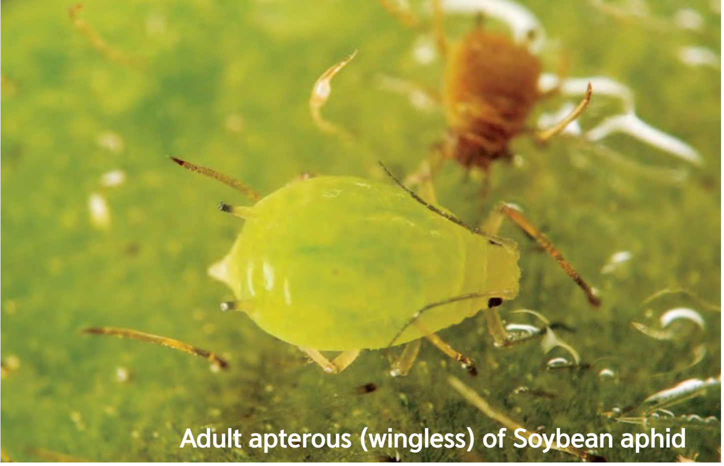
JADAM Natural Control Ratio

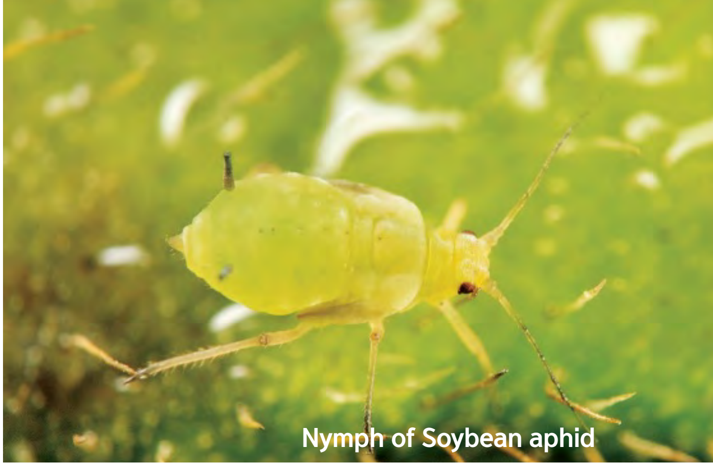
Refer to pages 25, 35~37

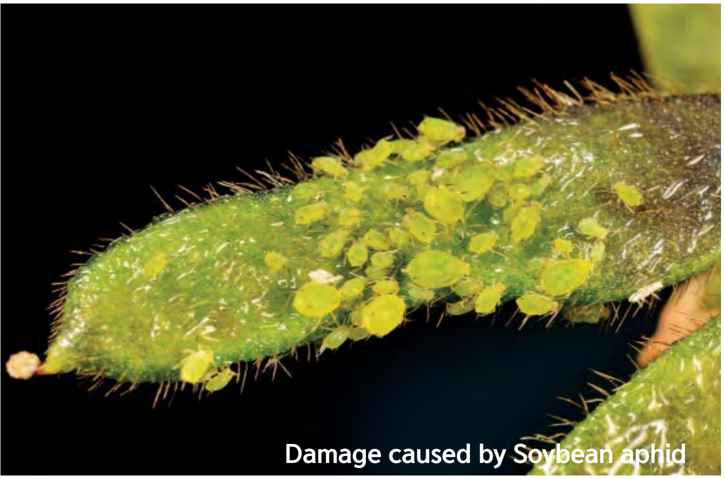
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	400ml
JHS		300ml	400ml
JMS			
NaOH			
Fine soil			
Control interval	10days	Visible effect	3hours

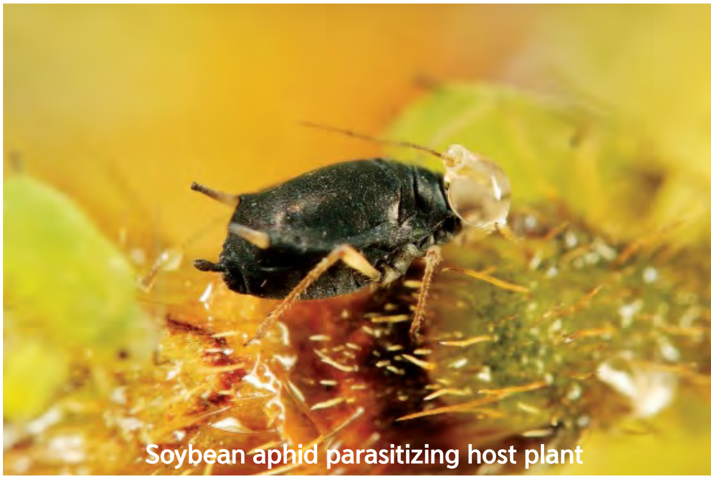
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

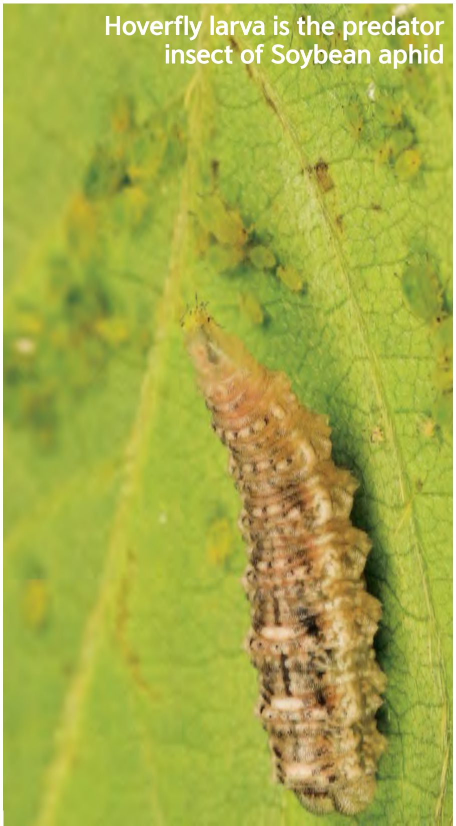
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

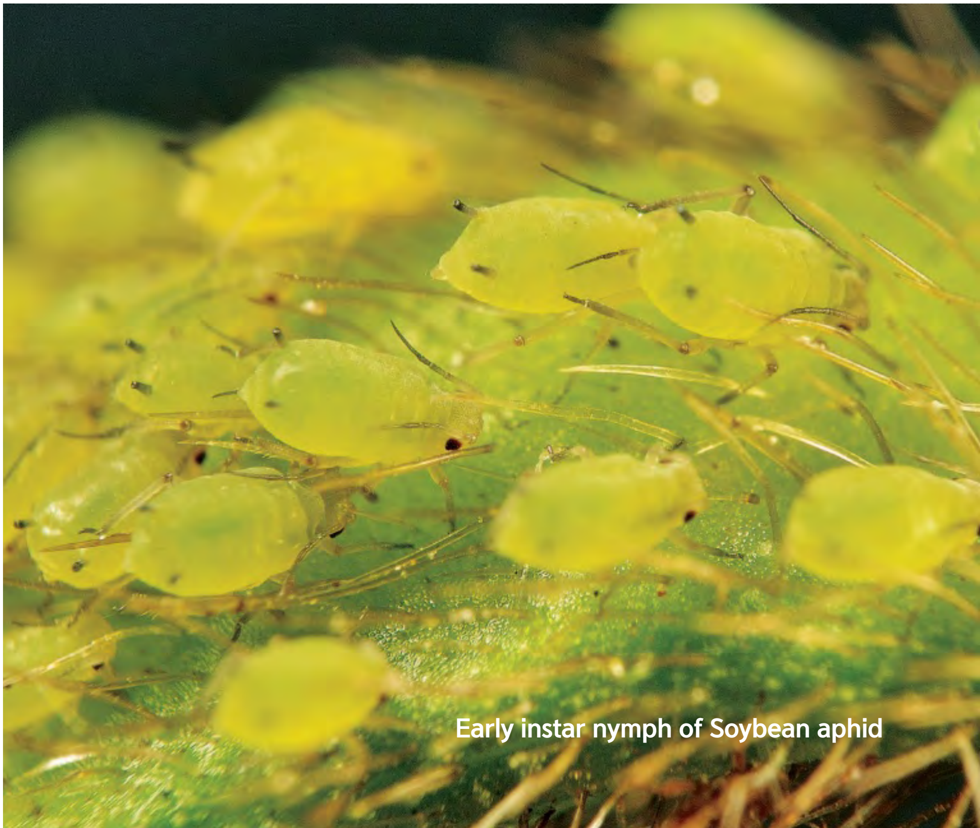

Adult apterous (wingless) of Soybean aphid


Nymph of Soybean aphid


Damage caused by Soybean aphid


Soybean aphid parasitizing host plant


Hoverfly larva is the predator insect of Soybean aphid


Early instar nymph of Soybean aphid

Greenidea nipponica

Description

The alate (winged) body length is about 4mm, black, and the body has long setae, and the antennae are divided into 6 thin segments and have scale patterns. The cornicle is very long, close to 2mm, cylindrical, rounded at the end, and has 6 long setae. The apterous (wingless) is about 2.5mm in size and black. Their eyes are black-red and have setae.

Life cycle

Although there is not much-recorded information on its ecology, it occurs several times a year, and there are repeated insect stages, and the adult generation appears in the fall.

Damage

Damage is not so significant since it occurs over a short period. First, it is desirable to establish a strategy to protect the predatory predatory insects such as grass dragonflies, ladybugs, flowers, and arachnids instead of spraying pesticides. The growth of the new branch is inhibited because of suction. (Korea National Arboretum)

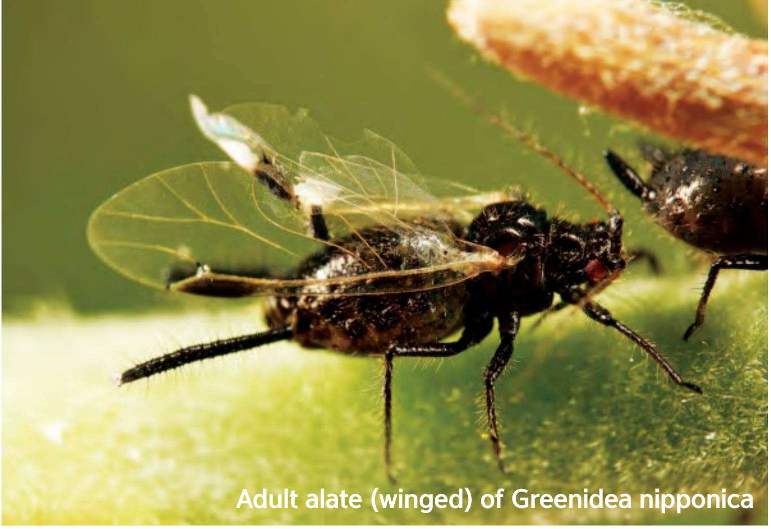
Refer to pages 25, 35~37

JADAM Natural Control Ratio

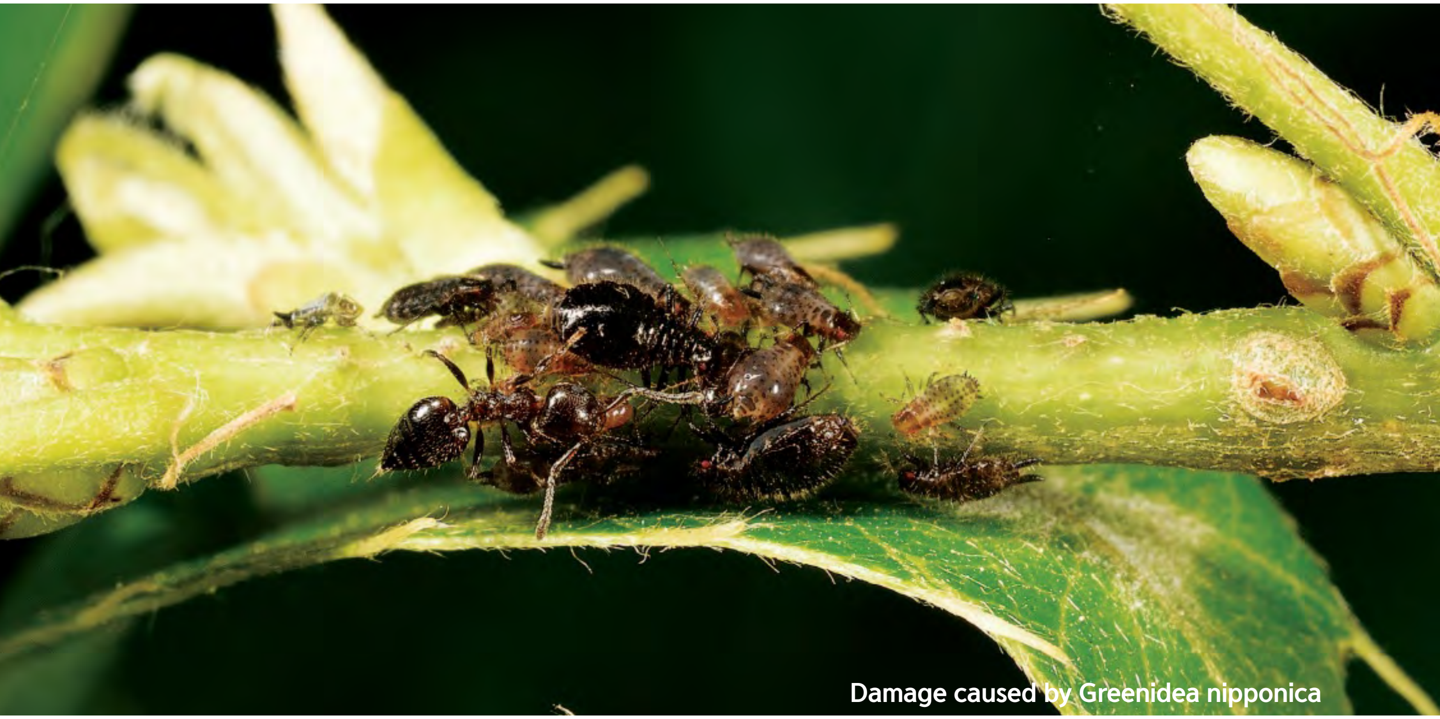
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

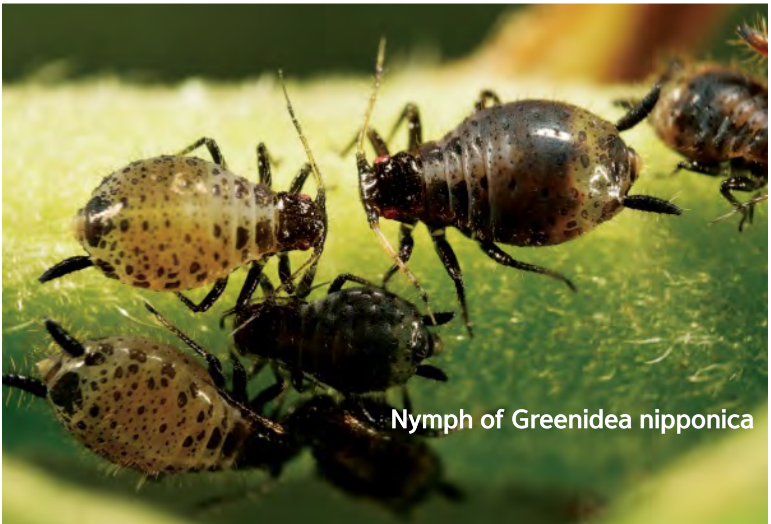
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



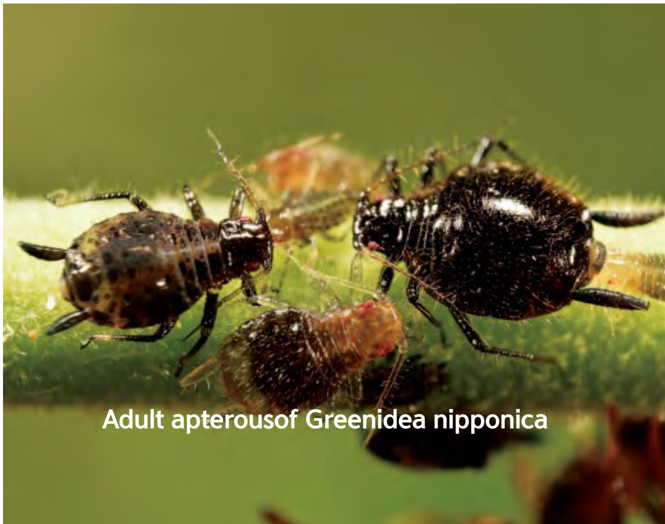
Adult alate (winged) of Greenidea nipponica



Damage caused by Greenidea nipponica



Nymph of Greenidea nipponica



Adult apterousof Greenidea nipponica

Blue alfalfa aphid

Acyrthosiphon kondoi

Description

The blue alfalfa aphid grows to 3 to 3.5 mm (0.12 to 0.14 inches). It is very similar in shape to the closely related pea aphid (Acyrthosiphon pisum), but is often more bluish-green. One important difference from the pea aphid is that the blue alfalfa aphid has dark evenly-colored antennae evenly.

Both apterous (wingless) and alate (winged) females occur, and winged aphids can disperse to new plants and form habitats. Males also occasionally occur and are smaller than females, green with brown marks on the head, thorax, and abdomen.

Life cycle

A native of Asia, the species has spread to other parts of the world including North America, South America, Australia and New Zealand; it was first detected in the United States in California in 1974 and spread to Nebraska by 1979, Georgia and Kentucky by 1983 and Maryland by 1992. It is mainly a pest of plants in the family Leguminosae including alfalfa, pea, lentil and cowpea.

The ideal environment in North America is very similar to that of the pea aphid, however, it is seen earlier in the spring and is more tolerant of cool weather than the pea aphid. As populations build up, they are increasingly affected by entomopathogenic fungi and parasitoids, with populations peaking and stabilizing. Hot summer weather, with temperatures averaging above 80.8 °F (27.1 °C), favours the plants' natural resistance mechanisms, and the numbers of aphids reduce sharply. There are both winged and wingless adult females and both can produce live young by viviparity although some females also produce batches of eggs.

Wingless forms are prolific and may have twelve or more generations in a season, producing young at the rate of seven nymphs per day. Winged forms produce much fewer young. These aphids may overwinter as eggs or as females, the latter moving from annual plants onto perennial legumes in the fall. (wikipedia)

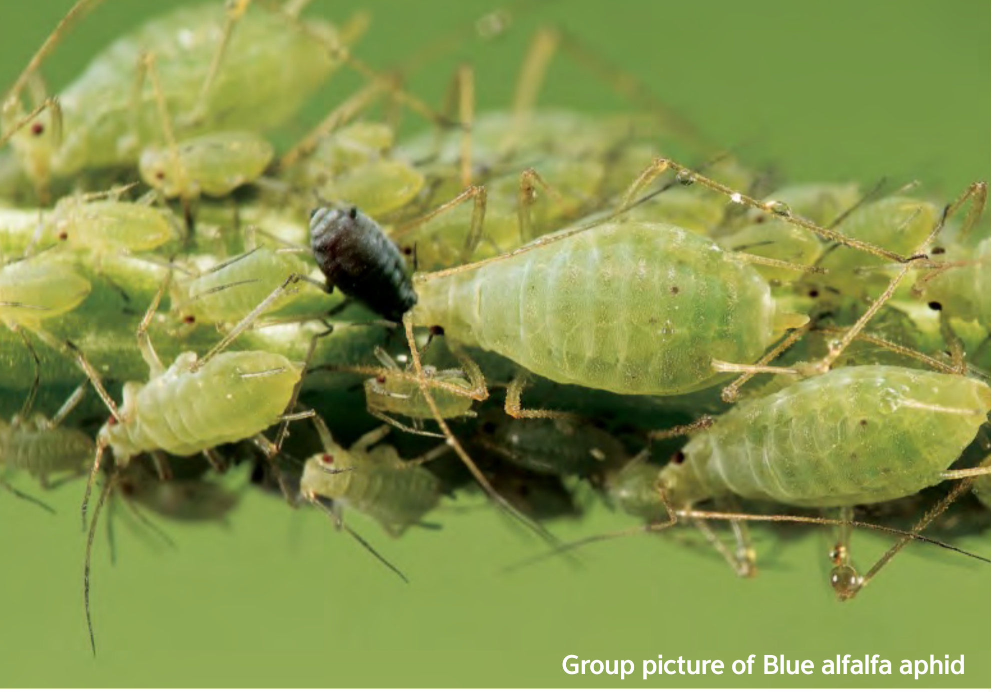
Refer to pages 25, 35~37

JADAM Natural Control Ratio

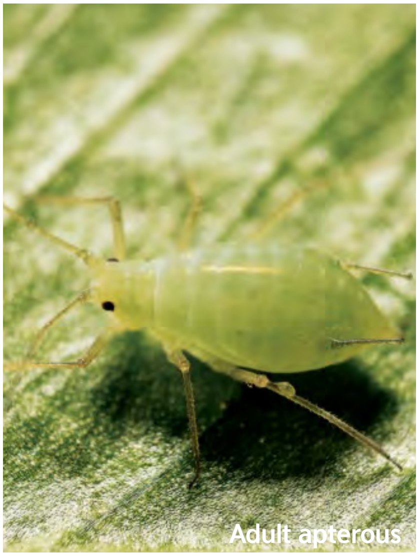
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		200cc	400ml
JHS		200cc	400ml
JMS			
NaOH			
Fine soil			
Control interval	7days	Visible effect	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 30g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

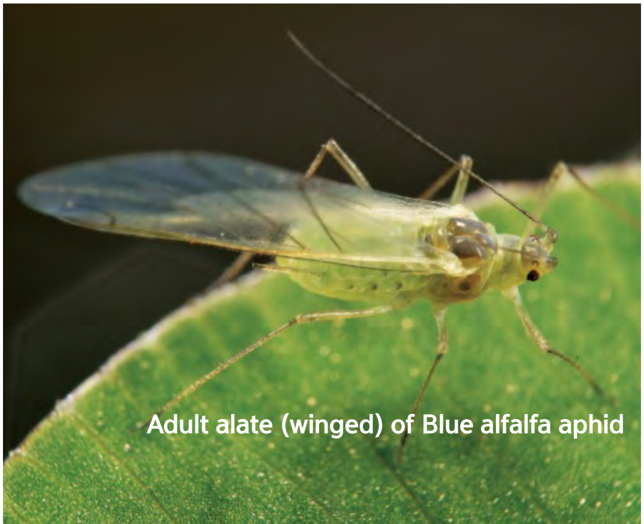
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Group picture of Blue alfalfa aphid



Adult apterous



Adult alate (winged) of Blue alfalfa aphid

Onion aphid

Neotoxoptera formosana

Description

In the case of apterous (wingless), the head, antennae, and legs are dark brown, the mouth frame, cornicle, tip, and tip of the head has dense micro setae, and the forehead inner side is almost parallel and has two tiny setae. The forehead inner side is almost parallel and has two tiny setae. Antennae are divided into 6 segments. The length is 2.18mm.

Life cycle

In colder regions, They overwinters as eggs, but they winters as apterous insects in warmer areas. Leaves are harmed from mid-May, and the most common occurrence is early mid-June. Like other aphids, the density decreases rapidly after the beginning of mid-July and then increases again as the day cools.

Damage

It sucks the sap (fluid) of Green onion, garlic, onion, lily, and many others, causing significant growth inhibition, wilt, and dwarf disease.

(National Crop Pest Management System/NCPMS)

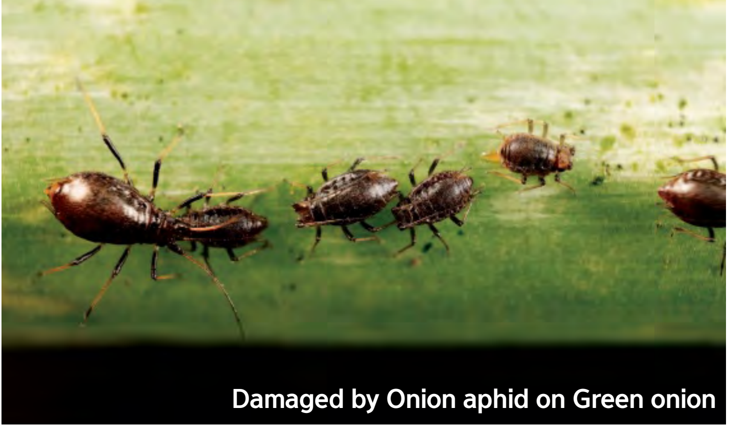
JADAM Natural Control Ratio

Refer to pages 25, 35~37

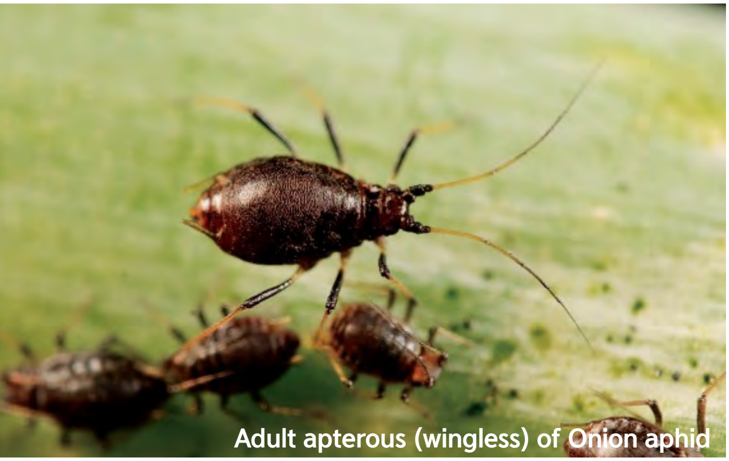
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	3hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 40g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

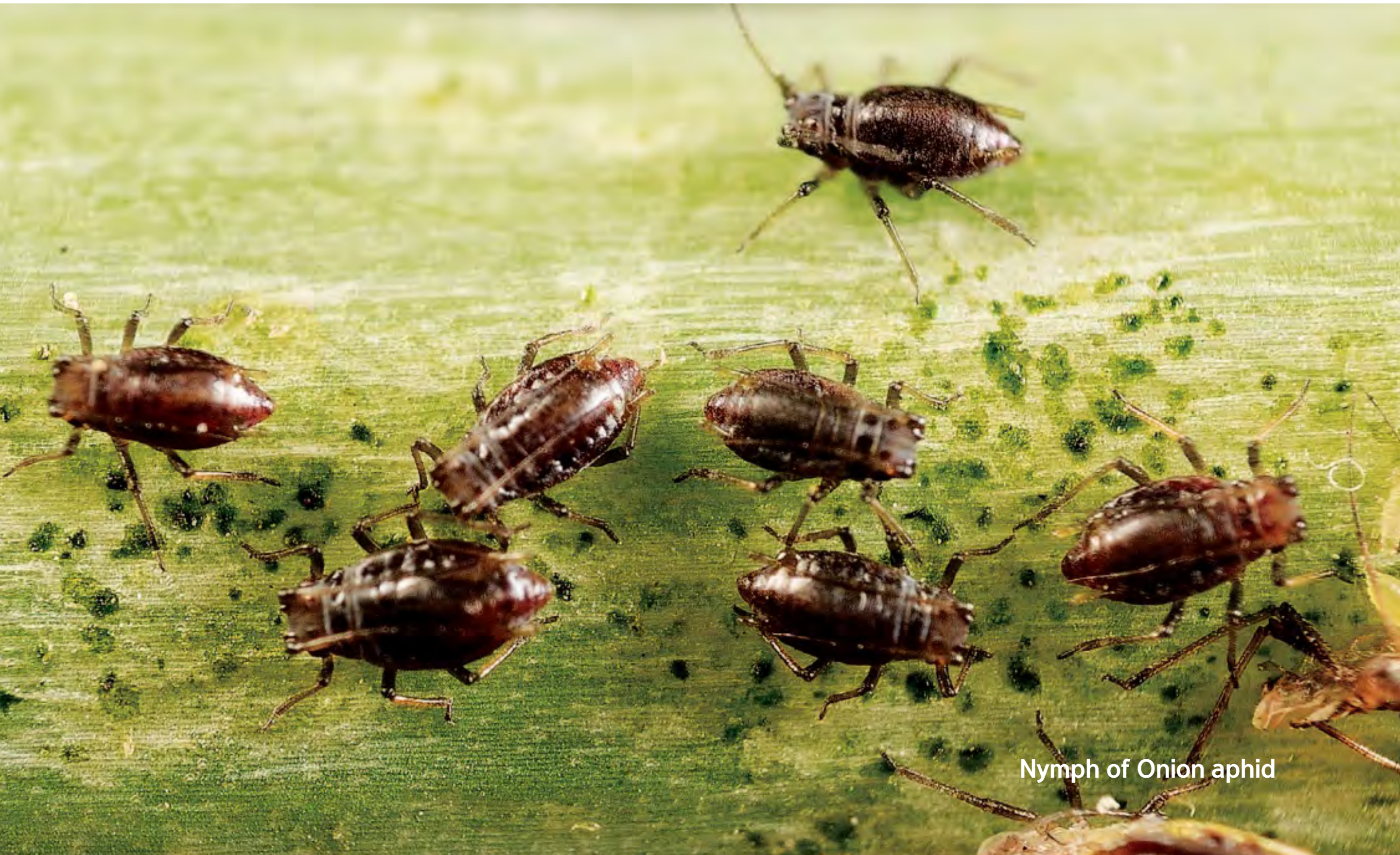


Damaged by Onion aphid on Green onion



Adult apterous (wingless) of Onion aphid

Damaged by Onion aphid on Green onion



Nymph of Onion aphid

Whitefly

It is an insect of the Aleyrodidae family which causes damage to horticultural crops. Adult pests are about 1.5mm long and are covered with lead material in the shape of whiteflies and is parthenogenesis.It spawns about 10 times a year in a greenhouse, and it multiplies in a short period, making it difficult to control. Besides damage to crops due to absorption of plant sap (fluid), excrement causes soot disease, which lowers the product value.
(RURAL DEVELOPMENT ADMINISTRATION)

Jumping plant louse

Bactericera gobica

Description

Adult length is about 2.5mm, and wing length is about 7.2mm, and the body color is various. Females are grayish-brown in winter, and males are dark. Eggs are 0.3mm, oval orange to yellow, forming a bottle like a grass dragonfly egg. The nymph is 0.5~4mm, initially orange-yellow, and turns yellow-green as it progresses toward late-instar, and its shape is oval and flat.

Life cycle

After wintering as an adult around the host plant, it moves around at the end of May, causing the most damage around June and July. It is problematic on goji berry farms in China. (Deogkee Park)

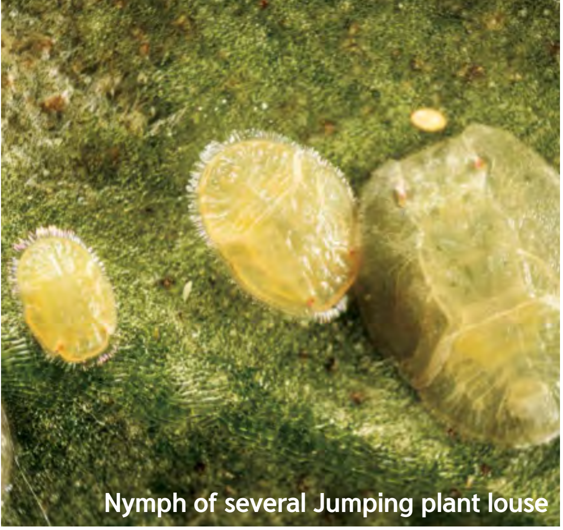
Refer to pages 25, 35~37

JADAM Natural Control Ratio

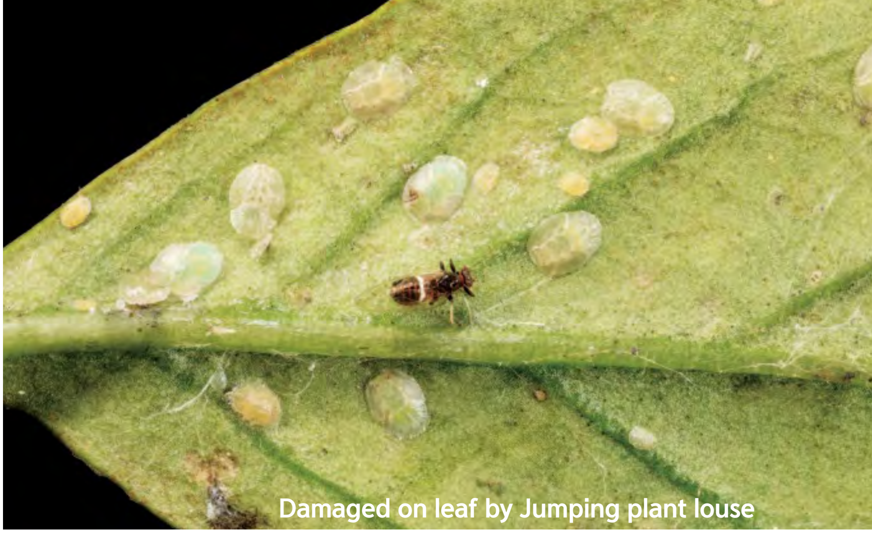
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

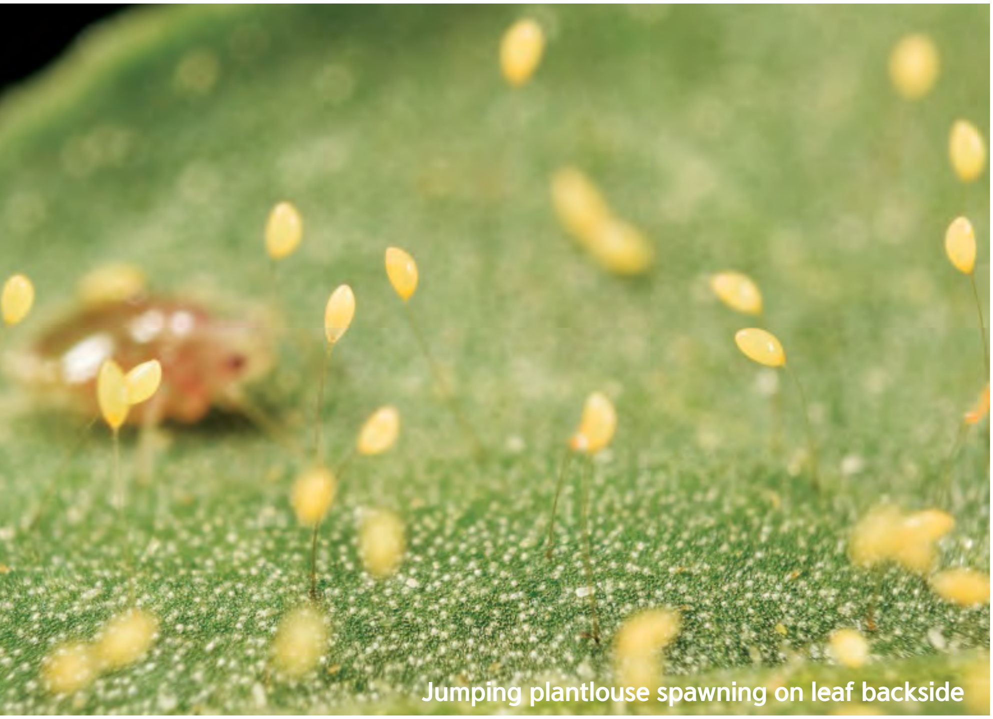
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



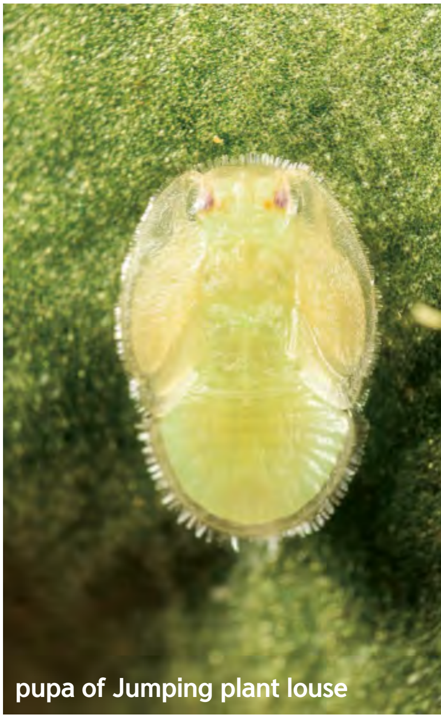
Nymph of several Jumping plant louse



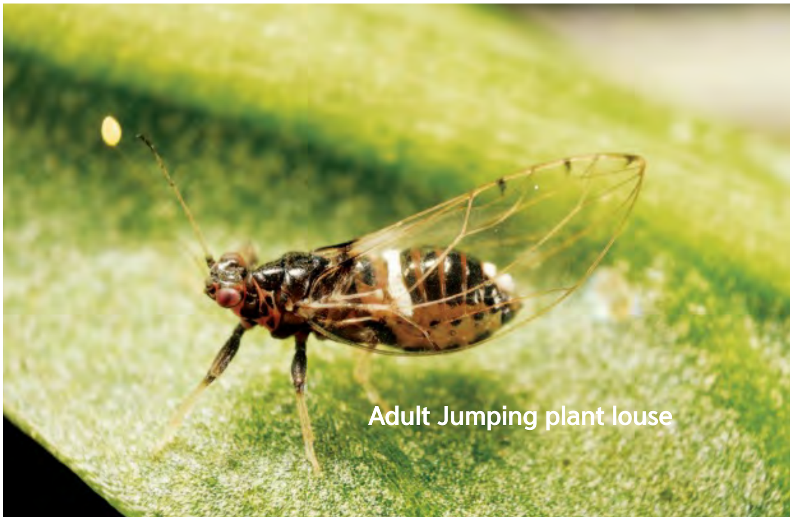
Damaged on leaf by Jumping plant louse



Jumping plantlouse spawning on leaf backside



pupa of Jumping plant louse



Adult Jumping plant louse

Pear sucker

Psylla pyricola

Description

The body length is about 2.5mm, and young nymphs are yellow, but the more they grow, the more green they get, and the fifth instar nymphs have a reddish-brown color on their wing setae. Eggs are oval and yellow on one side. They are characterized by a different form of a summer-type adult and a winter-type adult. In some cases, summer formation insects have a cicada-shaped green color, and the wing part is pale reddish-brown. The winter form nymph is dark brown, a little larger than summer type, and wing veins are visible.

Life cycle

The pear sucker occurs 5 times a year, and the first generation in occurs in mid-May, and the second generation appears in late June and tends to decrease in July and August when the temperature rises.

The third generation occurs in mid and late July, and the fourth generation occurs in late August. After the end of September, when the daytime length is shortened to 14 hours or less in autumn, the fifth generation of wintering-type adult insects appears. They mostly overwinter under the rough bark. Wintering nymphs migrate to an aquatic area where the maximum temperature reaches 7~10℃ in the middle of late February for mating and spawning in the middle of March. The eggs hatch before the pear tree blooms and parasitize in the tree's gaps or on the developing leaves.

Damage

The nymphs and adult insects mainly damage the leaves and infiltrate into the pear paper cover and absorb the sap (fluid) of the fruit. Because it secretes white wax, it is easy to misidentified as a mulberry mealybug (Pseudococcus comstocki). Since it secretes nectar while eating, it causes soot disease, and if the occurrence is severe, the leaves appear blackened. If the damage on the fruit is severe, the product value decreases and shortens the shelf life.

(National Crop Pest Management System/NCPMS)

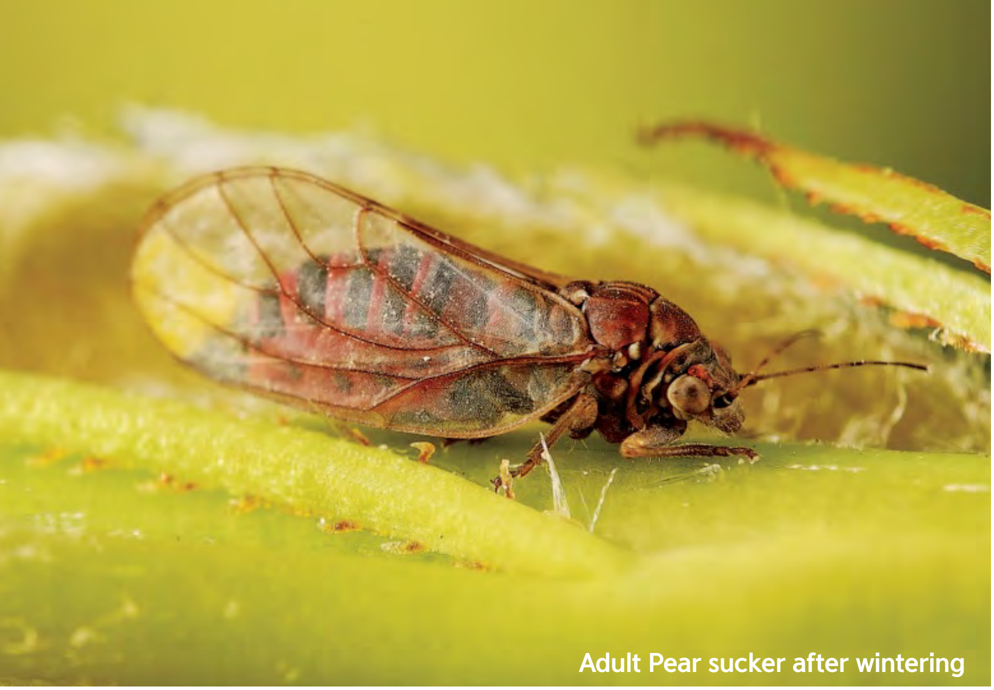
JADAM Natural Control Ratio

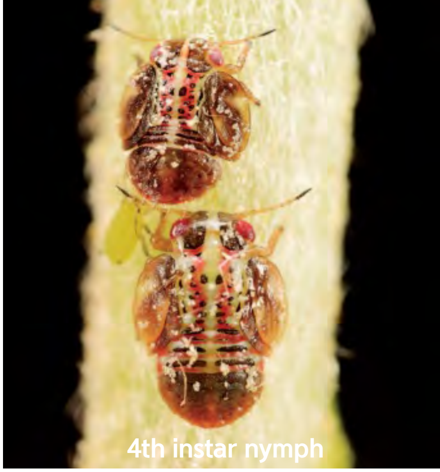
Refer to pages 25, 35~37

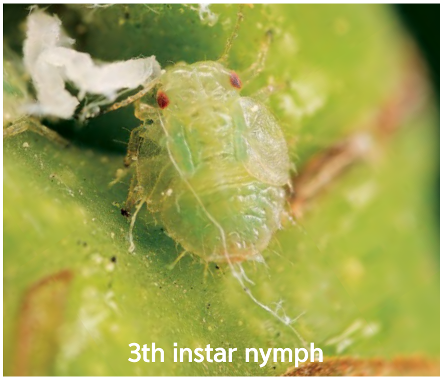
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	300ml	500ml
JHS		300ml	500ml
JMS			
NaOH		40g	60g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	3 hours

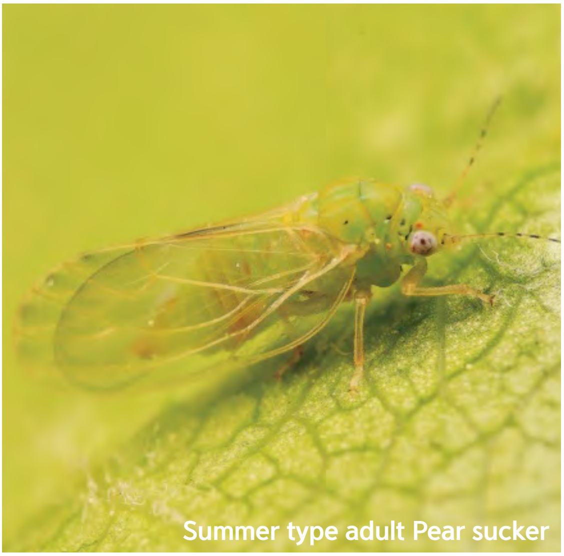
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Fine soil helps to increase the control effect by infiltrating and fixing pesticides deeply.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

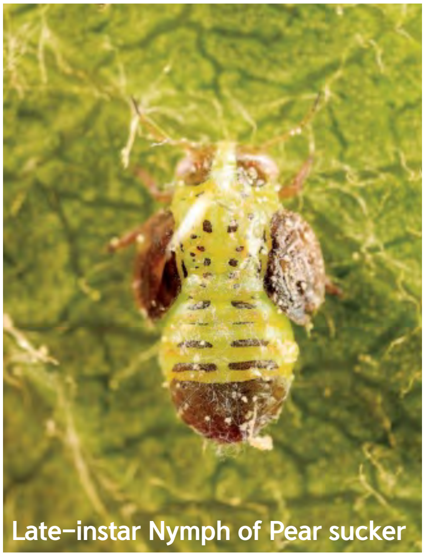
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

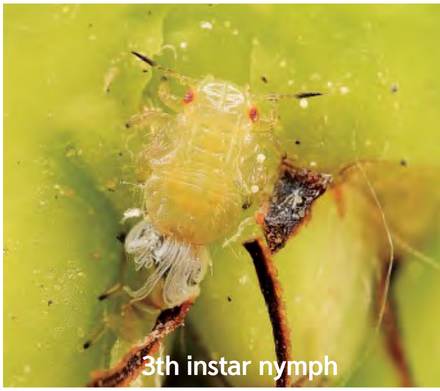

Adult Pear sucker after wintering

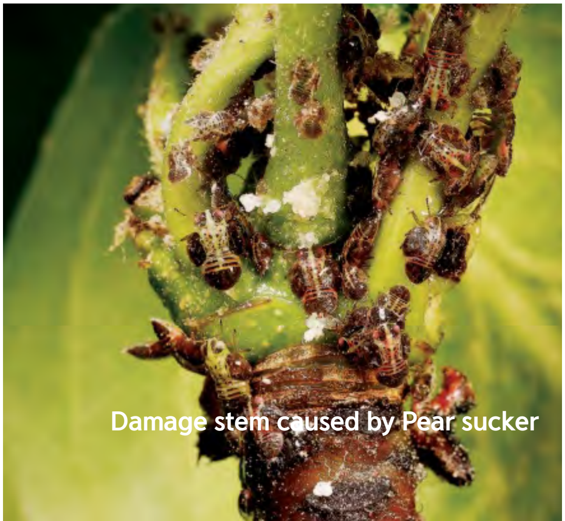

4th instar nymph

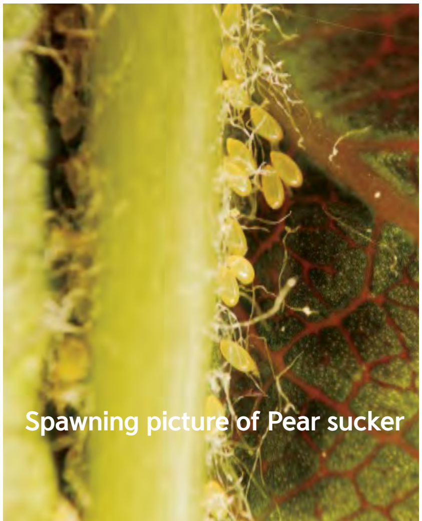

3th instar nymph

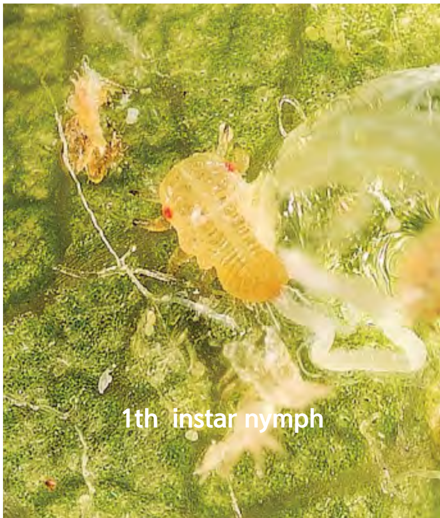

Summer type adult Pear sucker


Late-instar Nymph of Pear sucker


3th instar nymph


Damage stem caused by Pear sucker


Spawning picture of Pear sucker


1th instar nymph

Sweetpotato whitefly

Bemisia tabaci

Description

Eggs are light yellowish-green or dark brown. The pupa is somewhat flat and transparent white, and the outer submargin has no hairs arranged in a row. There are no waxy glands on the back that look like setae. The body's length is 0.8~1.0mm, and when viewed from above, the thorax side is the widest. It is distributed globally. There is a wide range of hosts such as fruiting vegetables, cucumbers, eggplants, tomatoes, leafy vegetables, and ornamental plants.

Adult insects have red eyes, a yellow body, and white wings. Adult insects are smaller than greenhouse whitefly (Trialeurodes vaporariorum), but it isn't easy to distinguish them by size. The body length is about 0.8mm, and the body color is dark yellow. When sitting on a leaf, the line on each wing when stretched forms an angle of 45° with the leaf.

Life cycle

Silverleaf whitefly parasitizes on the backside of the host plant's leaf, and female adults have a lifespan of about 10 to 24 days depending on the crop, spawning about 66 to 224 eggs on the young leaves of the plant. Caterpillars hatched from eggs move and disperse to plants and live a fixed life in one location. The first generation period is about 3 weeks at 27℃, and growth stops below 8℃, and it is reported that 3-4 generations per year in the outdoor, and more than 10 generations in the greenhouse are possible.

Damage

Silverleaf whitefly damage is caused by adult insects and larvae parasitic on the leaf's backside and absorbs the sap (fluid) of the plant. It causes crop growth inhibition, fading of leaves atrophy, fallen leaves, and a decrease in yield. The coloring becomes irregular on fruits such as tomatoes, paprika, and eggplants.

Nectar excreted by nymph is not only caused soot disease in plants but also affects the yield of fruits by inhibiting normal photosynthesis. It is also known to carry about 60 kinds of virus diseases such as leaf blight, tobacco leaf curling virus, and taro leaf curling disease.

(National Crop Pest Management System/NCPMS)

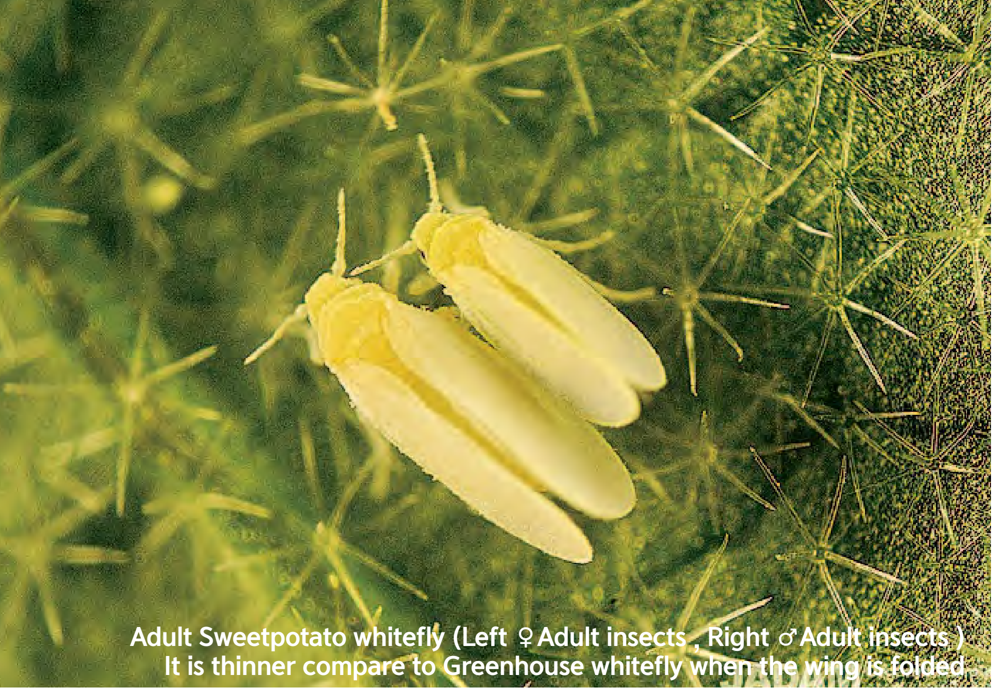
Refer to pages 25, 35~37

JADAM Natural Control Ratio

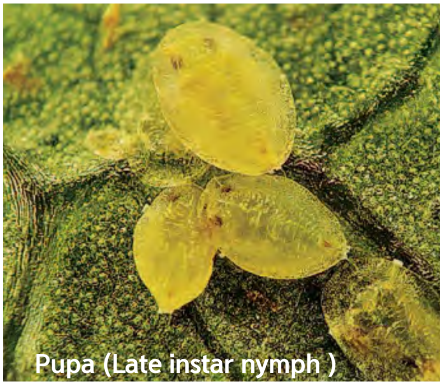
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			40g
Fine soil		40g	40g
Control interval	7days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 40g instead of JHS.
- There is a whitefly that flies away from pesticide control, so you can increase the effect by controlling it twice in a row at 30-minute intervals.

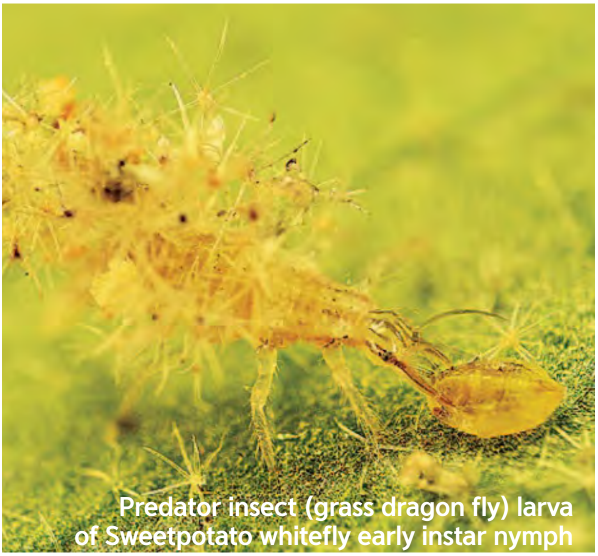
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



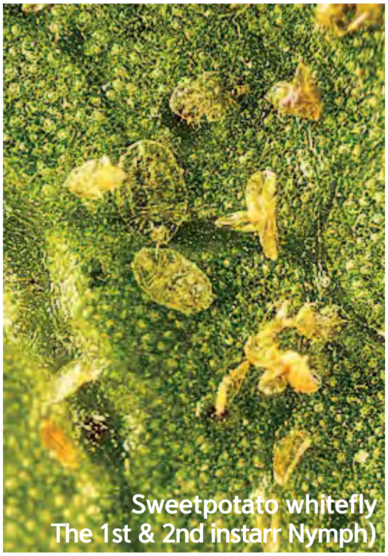
Adult Sweetpotato whitefly (Left ♀Adult insects , Right ♂Adult insects)
It is thinner compare to Greenhouse whitefly when the wing is folded



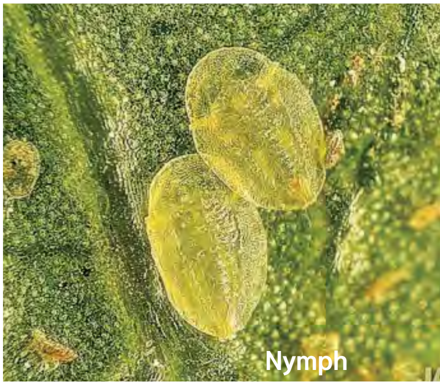
Pupa (Late instar nymph)



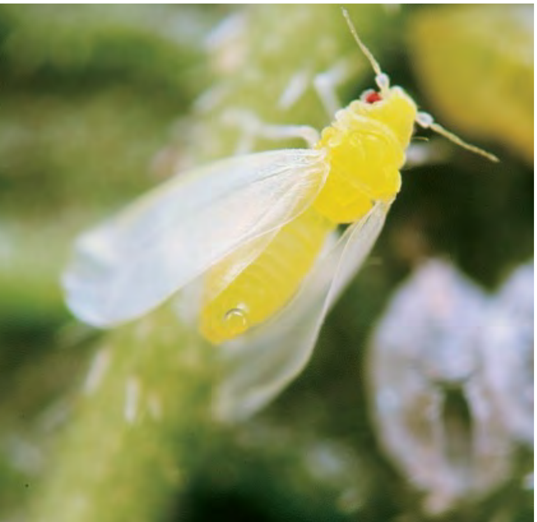
Predator insect (grass dragon fly) larva
of Sweetpotato whitefly early instar nymph

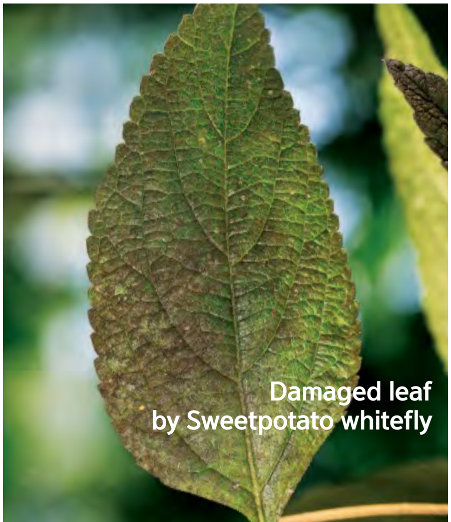


Sweetpotato whitefly
The 1st & 2nd instarr Nymph)

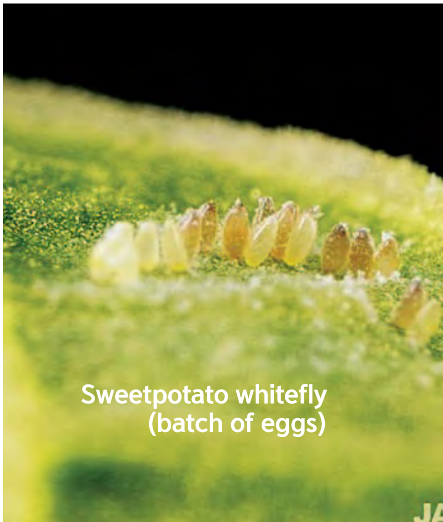


Nymph





Damaged leaf
by Sweetpotato whitefly



Sweetpotato whitefly
(batch of eggs)

Mulberry psyllid

Anomoneura mori

Description

The body length of a female adult is 3-4mm, the head is close to a triangular shape and is yellowish-green or dark brown. It occurs once a year and winters on weeds as adult insects. Female adults spawn 200-300 eggs in the beginning of May when new leaves appear. The egg's size is about 0.3mm, it is oval, and the period of the egg stage is about 18 days.

The nymph's body length is about 3mm, and it secretes white material at the end of the abdomen like a thread. The adult appears in late July. they occur a lot in mountainous areas or in poorly ventilated and humid mulberry fields.As the nymphs form a group, they suck the sap of the leaves and cause damage. The leaves squash and turn yellow.

Damage

Although it does not directly damage the mulberry tree, it degrades its value as feed for silkworms. Especially in the mulberry field, it becomes difficult to pick mulberry, and it is controllable with an appropriate control agent 2-3 times at intervals of 3 days during the outbreak. Once a tree gets damage, pests will appear every year and must be controlled whenever it occurs again. (Doosan Encyclopedia)

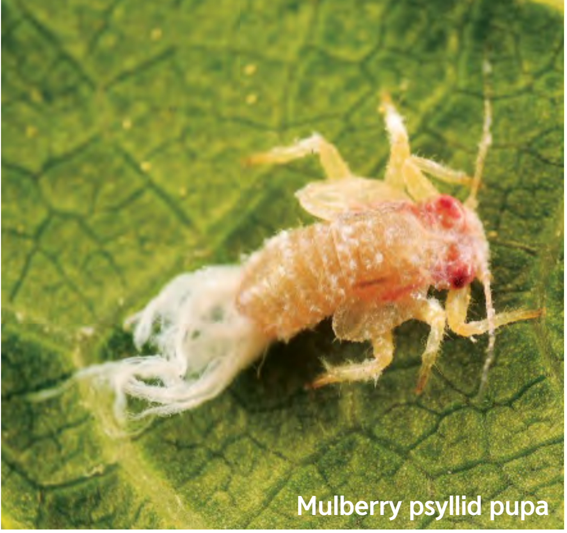
Refer to pages 25, 35~37

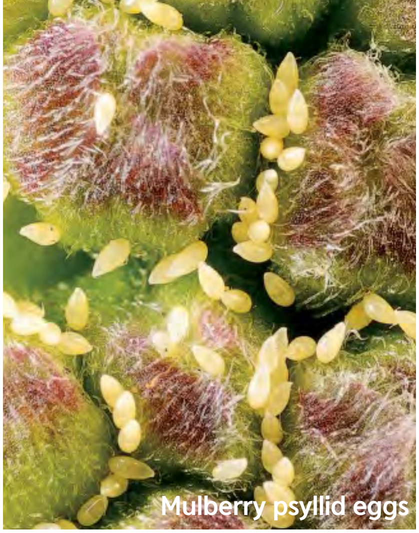
JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	7days	Visible effect	3hours

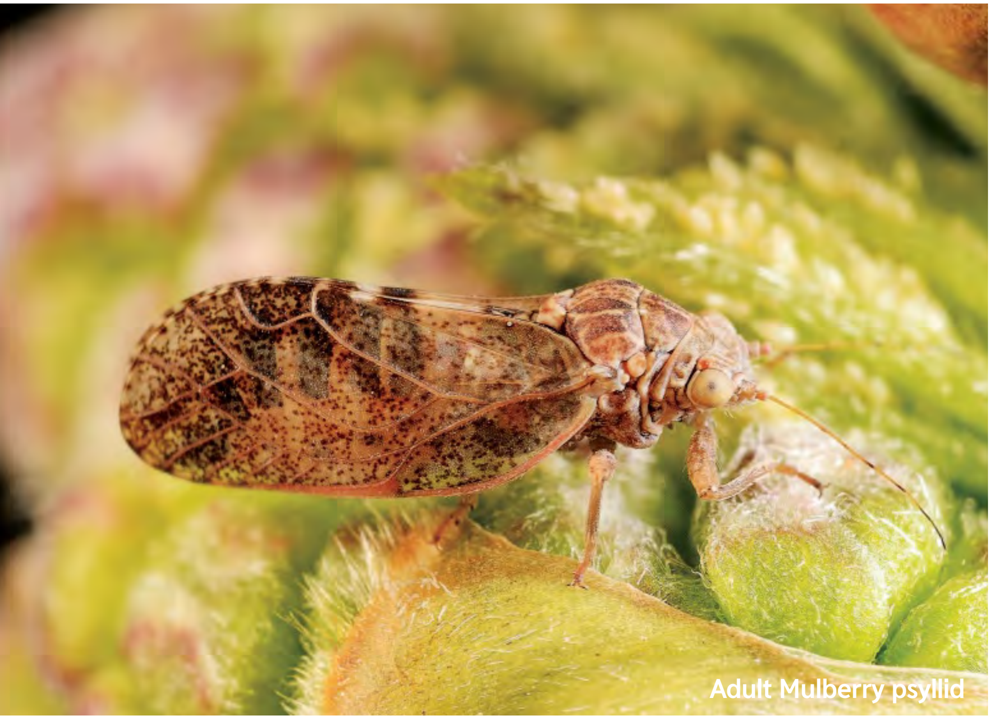
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

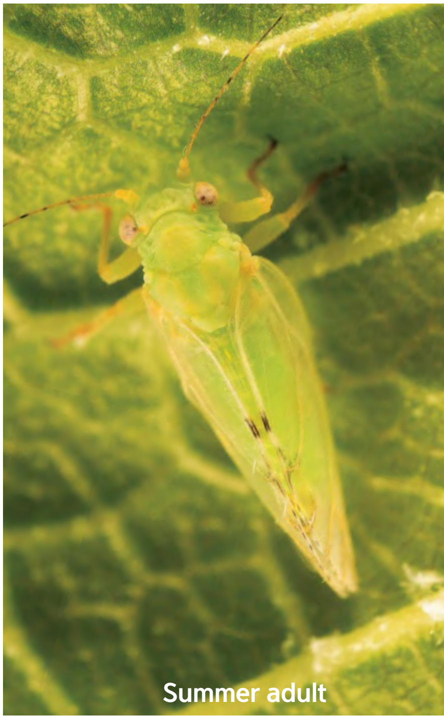
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

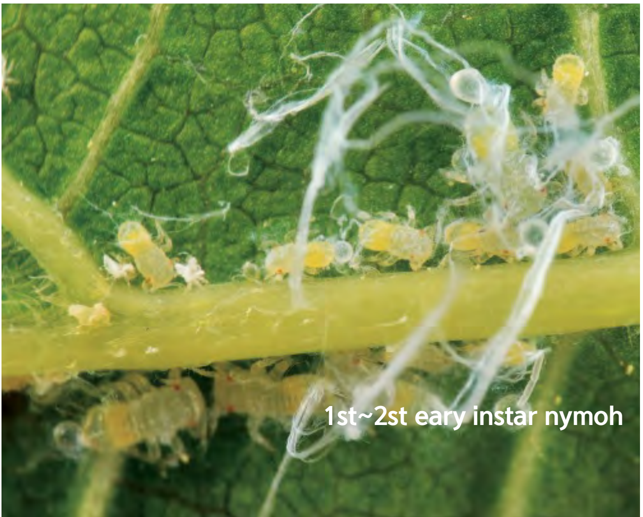

Mulberry psyllid pupa

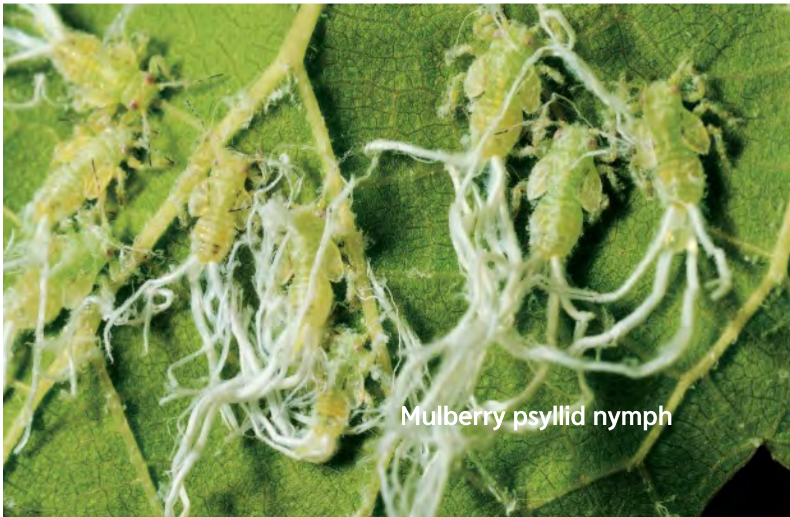

Mulberry psyllid eggs

Damaged mulberry tree


Adult Mulberry psyllid


Summer adult


1st~2st eary instar nymoh


Mulberry psyllid nymph

Greenhouse whitefly

Trialeurodes vaporariorum

Description

Greenhouse whitefly originated from the southwestern part of North America and later traveled across the whole America continent, Western Europe, Africa, Australia, and Iran until around 1970, and was not found in Asia.

The body length of an adult is 1.4mm, and the male is slightly smaller than that of the female, and the color is pale yellow, but the body is covered with white waxy powder like flour and has a white color. The egg is shell-shaped with a stalk, and the length is 0.2mm. The egg stalk is inserted into the leaf tissue and stands upright to the leaf surface. It becomes white or pale yellow, immediately after spawning but discolors to bluish-black when hatching.

The larvae are white or light yellow, and the shape of the pupa is oval with thorn-shaped wax projections on the back, and the size is about 0.7 to 0.8mm. It is different from a larva that has erected setae on the posterior side of head and thorax.

Life cycle

It takes about 3-4 weeks from egg to adult. In the case of adult life span, females are 17.7-30 days, males are 13.9-24.5 days, females lay an average of 8 eggs per day, and lay about 150-300 eggs in their lifespan.

Adult Greenhouse whiteflies lay eggs on young leaves at the top, move upwards as the crop grows. They live on the behind of the leaves, and larvae are almost fixed and concentrated on the middle or lower leaves. Annually, greenhouse whiteflies pass 7 generations in the open field but occur more than 10 times a year in warm facilities such as greenhouses.

Damage

The growth of the leaves and shoots of the plant is inhibited or faded as the nymph, and adult insects suck up the plant's fluid by piercing the leaf with their mouth. Soot disease is generated by the excrement of pests, which inhibits photosynthesis and transmits various viral diseases such as yellow flower disease. (National Crop Pest Management System/NCPMS)

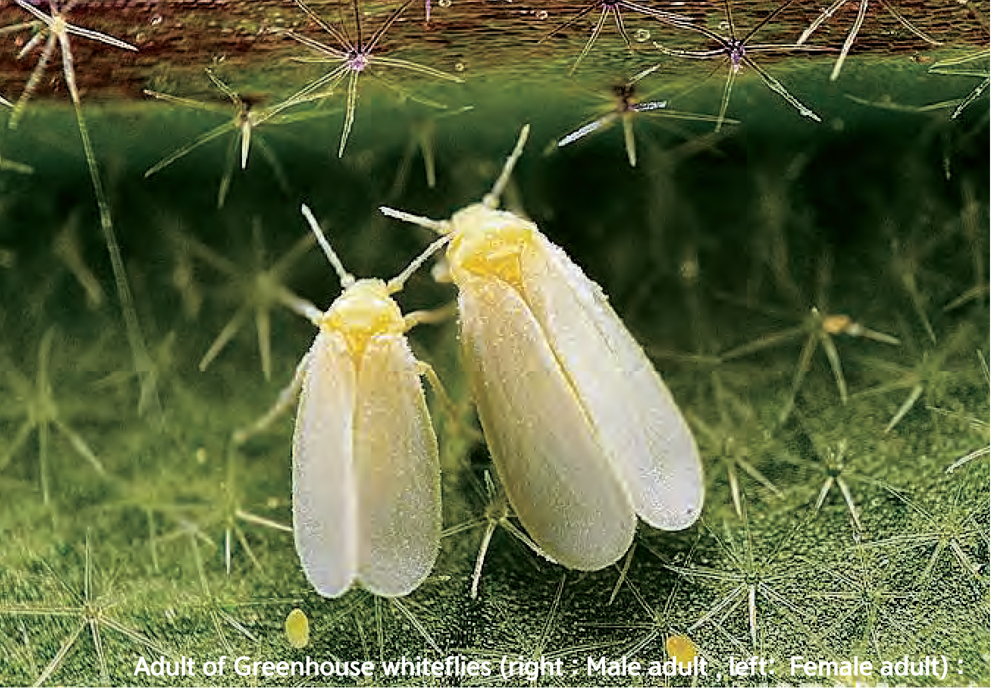
Refer to pages 25, 35~37

JADAM Natural Control Ratio

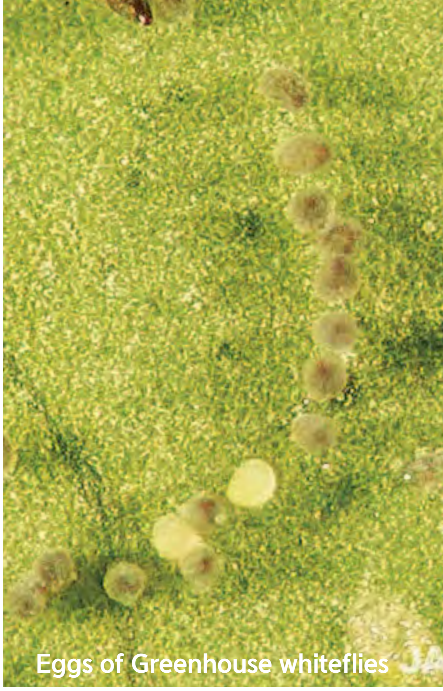
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			40g
Fine soil		40g	40g
Control interval	7days	Visible effect	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 40g instead of JHS.
- There is a whitefly that flies away from pesticide control, so you can increase the effect by controlling it twice in a row at 30-minute intervals.

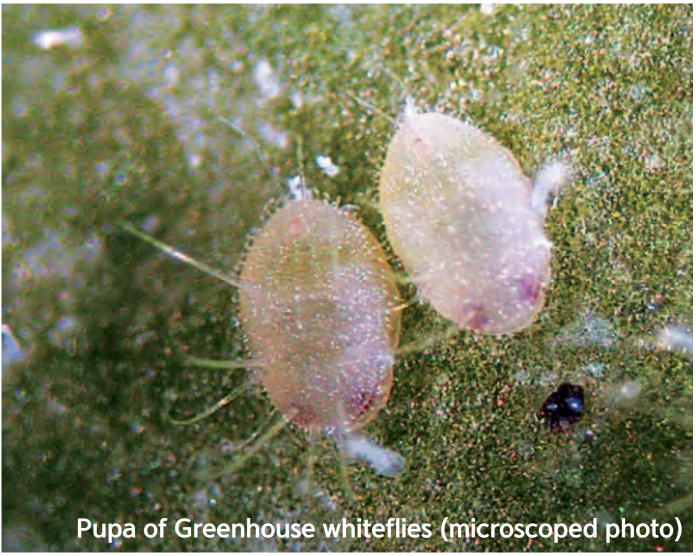
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



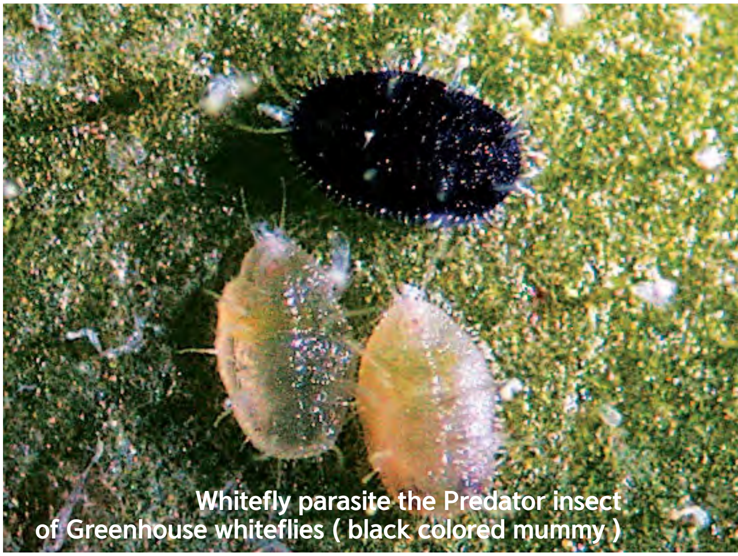
Adult of Greenhouse whiteflies (right : Male adult , left: Female adult) :



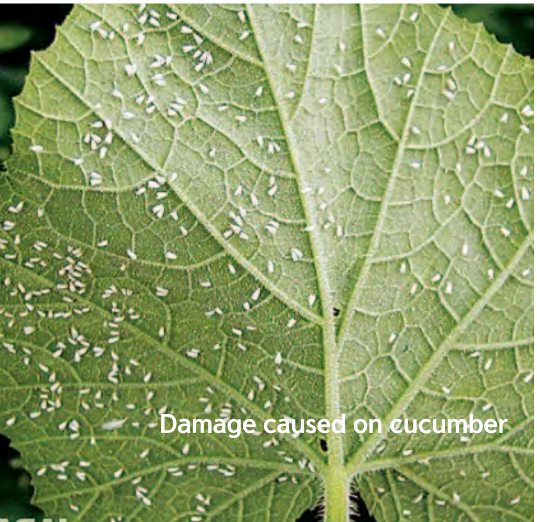
Eggs of Greenhouse whiteflies



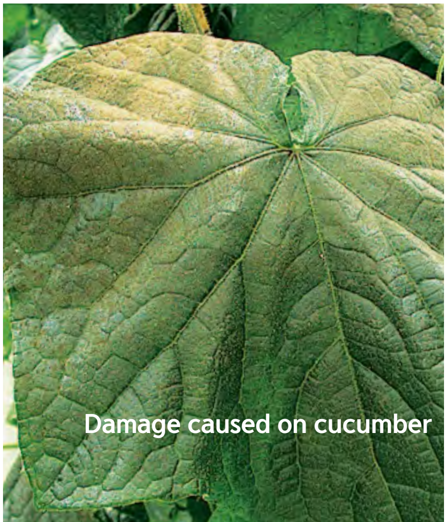
Pupa of Greenhouse whiteflies (microscoped photo)



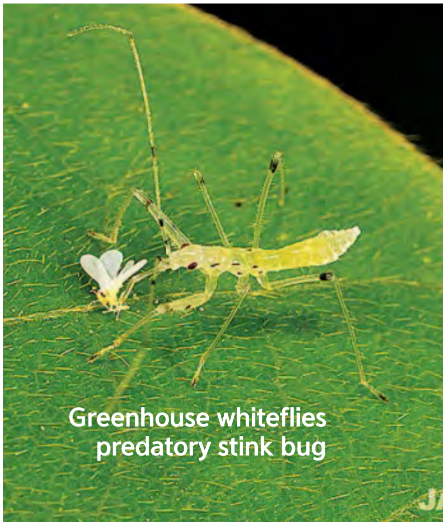
Whitefly parasite the Predator insect of Greenhouse whiteflies (black colored mummy)



Damage caused on cucumber



Damage caused on cucumber



Greenhouse whiteflies predatory stink bug

Cabbage whitefly

Aleyrodes proletella

Description

Adults are 1.5 mm in length. They have white wings with four gray spots. The wings are white due to a powdery wax. The head and thorax are dark, The head and thorax are dark, while the underside is yellow and also covered with a layer of wax. The eyes are red. The species is a pest on various Brassica species (mainly Brussels sprout and Kale) and Fragaria. It also feeds on various wild plants, including Capsella bursa-pastoris. It is found in colonies on the backside of leaves. They suck in the phloem of leaves and pollute these by excreting nectar,causing mold growth.

Life cycle

There are usually four to five generations per year. The development of a generation varies from three to six weeks. A female can lay up to 150 eggs. (wikipedia)

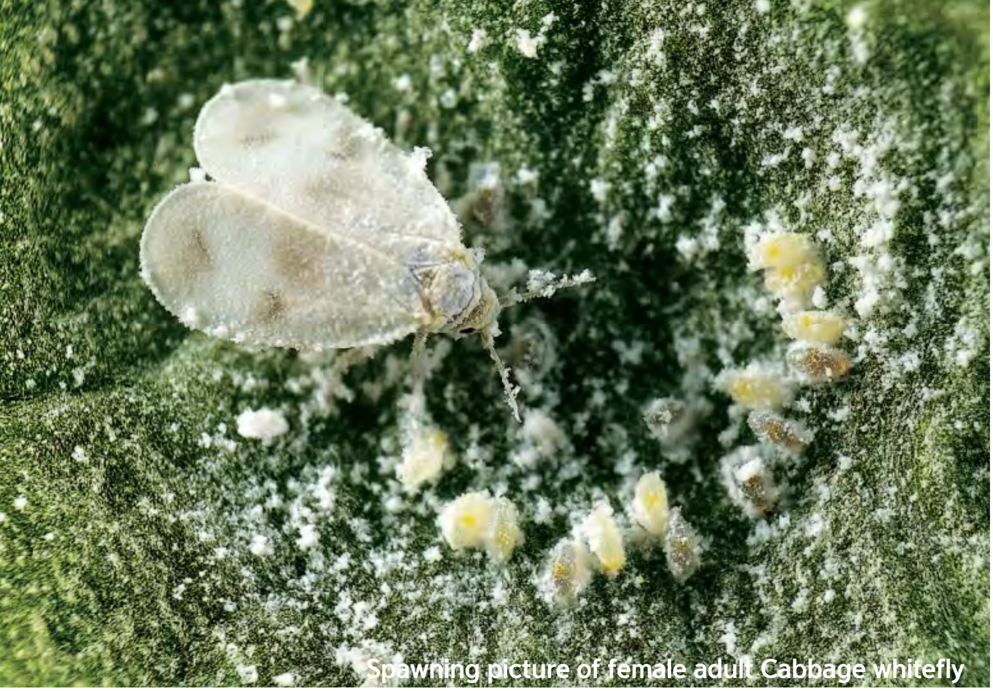
Refer to pages 25, 35~37

JADAM Natural Control Ratio

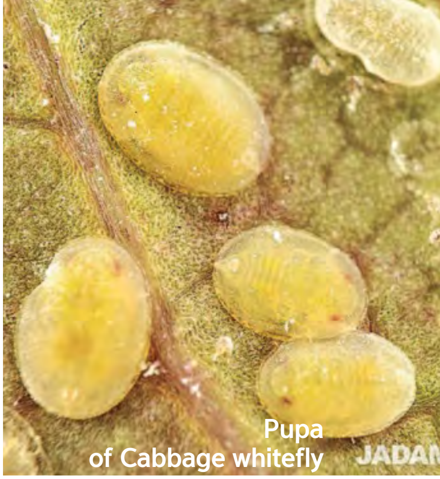
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		300ml	500ml
JMS			
NaOH			40g
Fine soil		40g	40g
Control interval	7days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 40g instead of JHS.
- There is a whitefly that flies away from pesticide control, so you can increase the effect by controlling it twice in a row at 30-minute intervals.

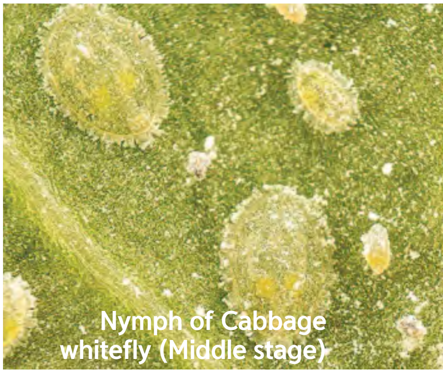
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



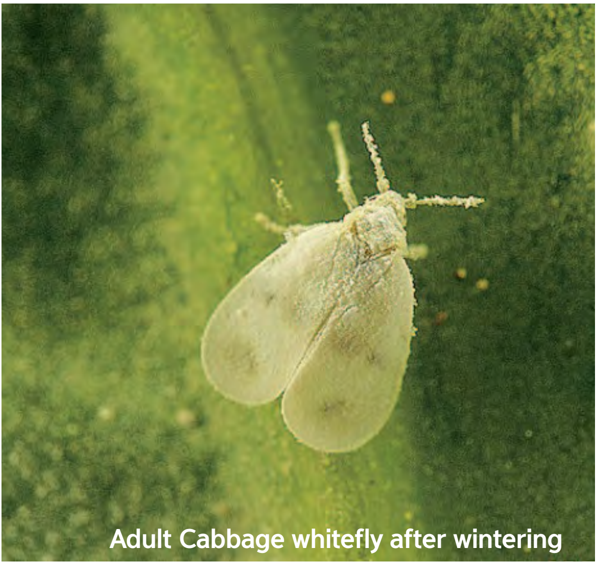
Spawning picture of female adult Cabbage whitefly



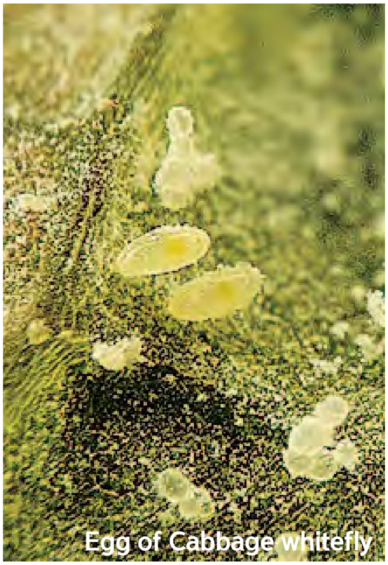
Pupa
of Cabbage whitefly



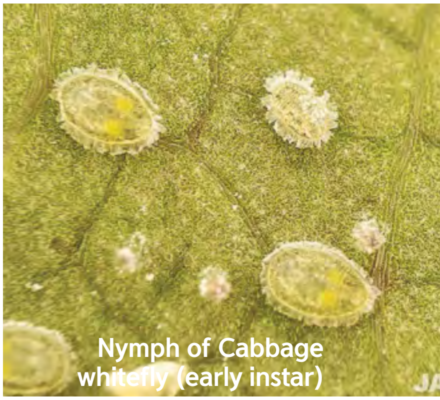
Nymph of Cabbage
whitefly (Middle stage)



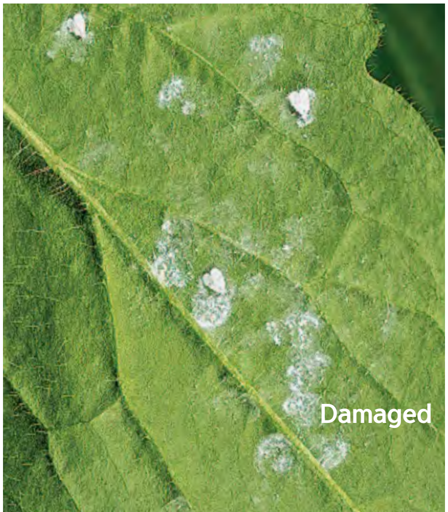
Adult Cabbage whitefly after wintering



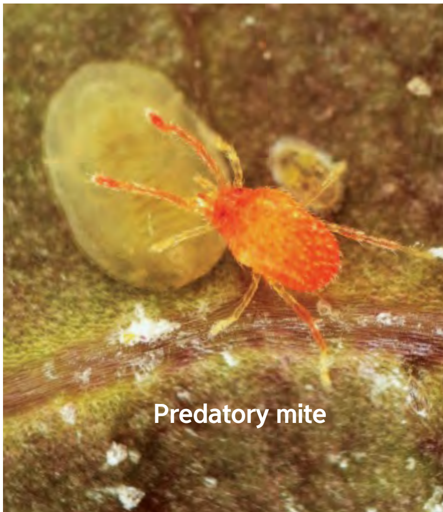
Egg of Cabbage whitefly



Nymph of Cabbage
whitefly (early instar)



Damaged



Predatory mite

Thrip

Thrips are slender insects with fringed wings and unique asymmetrical mouthparts. Usually has 0.5 to 10 mm in body size. They live on flowers or leaves, and some are predatory, but most of them feed on plants. Some species feed on microorganisms on fallen leaves or dead logs, and they usually have wings, but the veins of the wings are degenerated and have wings that resemble a duster.

Sometimes, a wingless form appears during development. About 3,000 species are distributed around the world, and they are known as tropical insects. The color of the body is generally black, dark brown, and light yellow. Females have well-developed spawning ducts(ovipositor).

Thrips recur several times a year, and as adults, they spend the winter under the bark, fallen leaves, and the ground. Green onion thrips and rice thrips are well known pests. (Doosan Encyclopedia)

Ponticulothrips diospyrosi

Life cycle

The size of an adult insect is about 2.2mm in length and is black. The nymph is around 1.8mm, and the body is light orange to yellow, the head, antenna (tactile sensor), and legs are black.

From mid-April, wintering adult insects begin to cause damage after persimmon leaves develop, and the edges of the damaged leaves roll inward.

Damage

The fruit damage appears around June, and the damaged fruit has black or brown damage traces (small spots) lined up in a ring shape. Damage traces remain and hurt the fruit's enlargement until the harvest season, resulting in poor quality. They occur once a year, but a second-generation may appear in rare cases.

(National Crop Pest Management System/NCPMS)

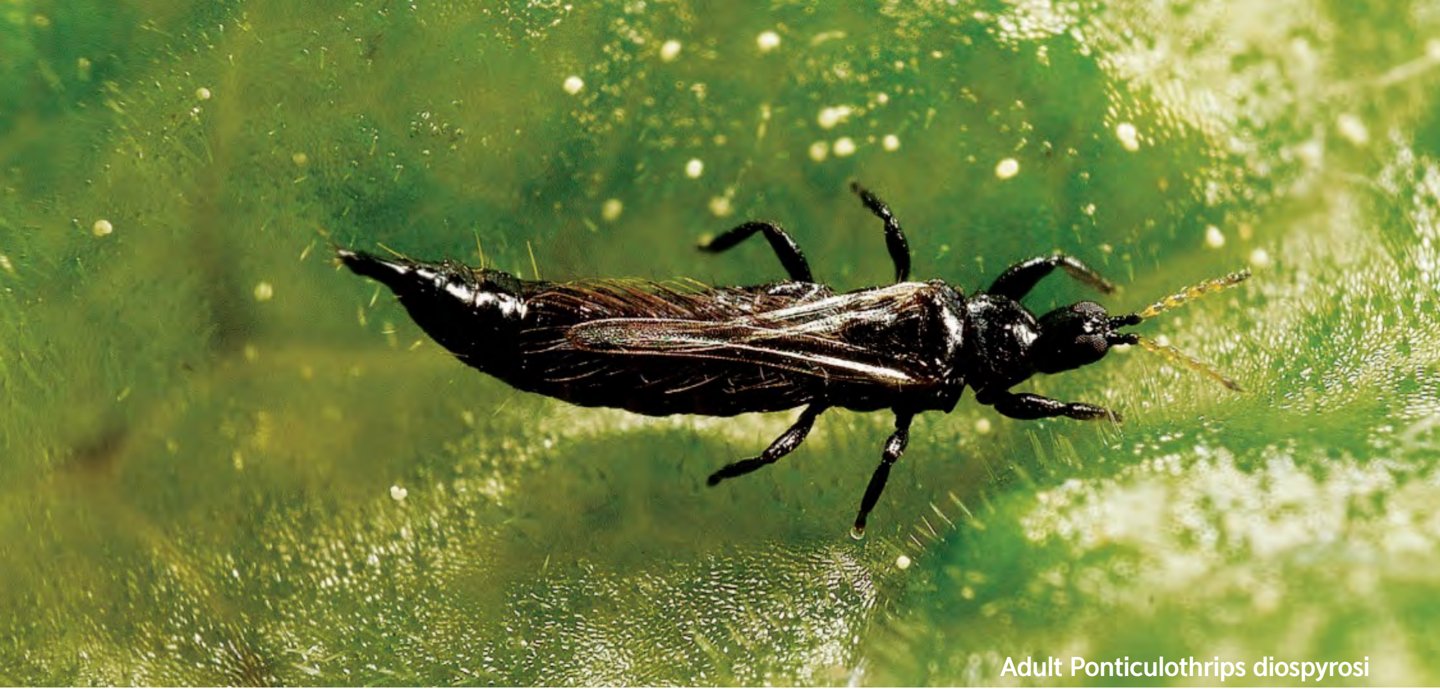
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	**Visible effect**	3 hours

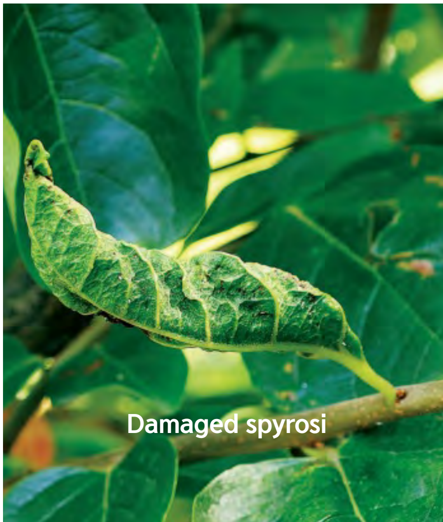
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Ponticulothrips diospyrosi

Pupa (late instar nymph)



Damaged spyrosi

Western flower thrips

Frankliniella occidentalis

Description

The female adult of the flower thrip has a body length of 1.4~1.7mm, the color of the body is light yellow to brown with a large variation, and there is a brown band on the abdomen. Male adult insects are 1.0-1.2mm long, smaller and thinner than females, and their body color is bright yellow. The wings of adult insects have full veins and long hairs are regularly organized around the wings. Egg spawns in the plant's soft tissue, and the size is about 0.3mm, tiny and slightly curved. The larvae are milky white but gradually turn yellow as their body grows. The pupa are in the form of larvae and have rough skin, they are atrophied, and stay on the soil surface.

Life cycle

It is a major pest of the greenhouse horticultural crops. It is estimated to occur more than 10 times a year in a suitable environment. Adult flower thrip spawns in plant tissues, the nymphs hatch from the eggs and grow while damaging the plant. Then they become the 2nd instar nymph, and become adults after passing through the first and second pupa periods in the ground. The period from egg to adult is about 18 days (25°C), and the lifespan of an adult flower thrip is 60 days (20°C), which is longer than that of melon thrips and has excellent fertility due to the number of spawning per female.

It often occurs when a high temperature and dry environment continues. Using magnifying glasses are necessary for observing young larvae and adult insects on the behind of the crop's leaf. You can hang white or yellow sticky traps 20~30cm above the top of the crop and trap adult thrips to check the population density.

Damage

It mainly harms flower buds and young leaves. Young leaves become deformed and crushed when infested by flower thrips. Many silver-white spots are formed on the leaves, and gray-light brown spots are formed in severe cases.

(National Crop Pest Management System/NCPMS)

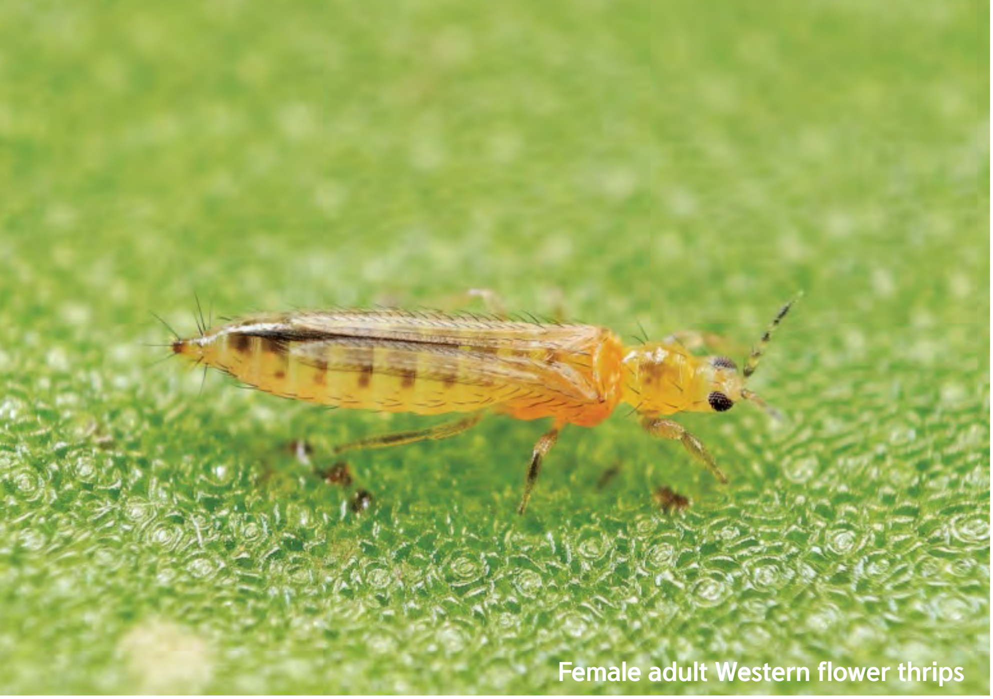
Refer to pages 25, 35~37

JADAM Natural Control Ratio

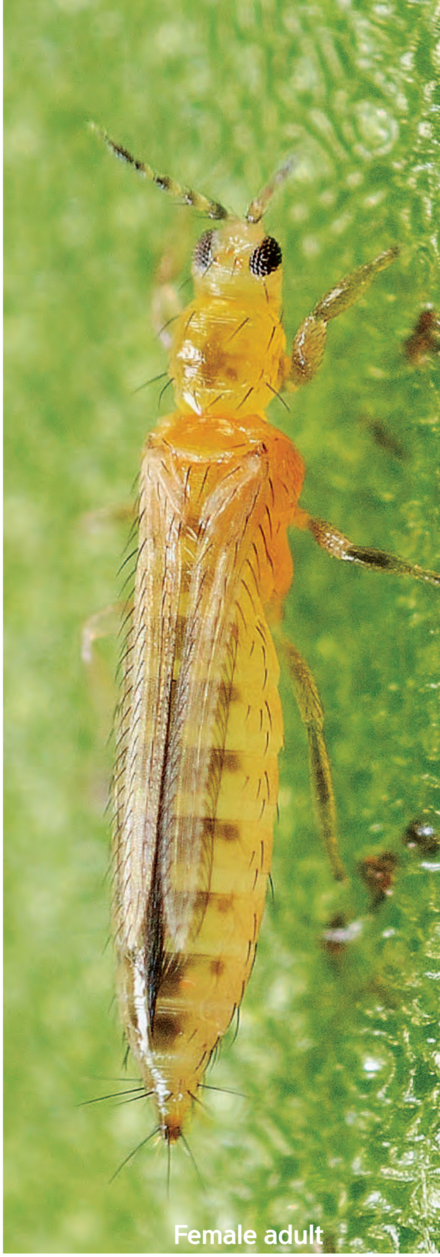
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	**Visible effect**	3 hours

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

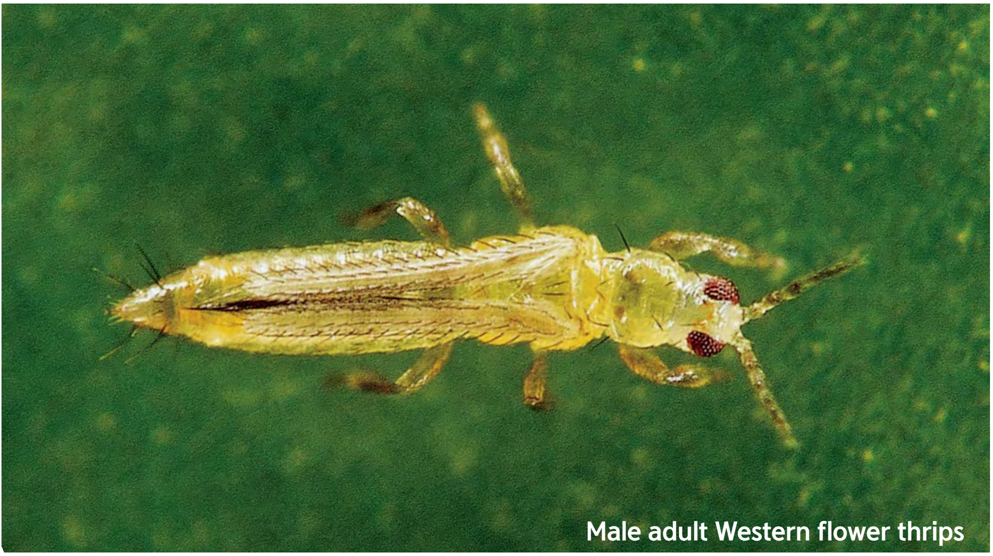
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



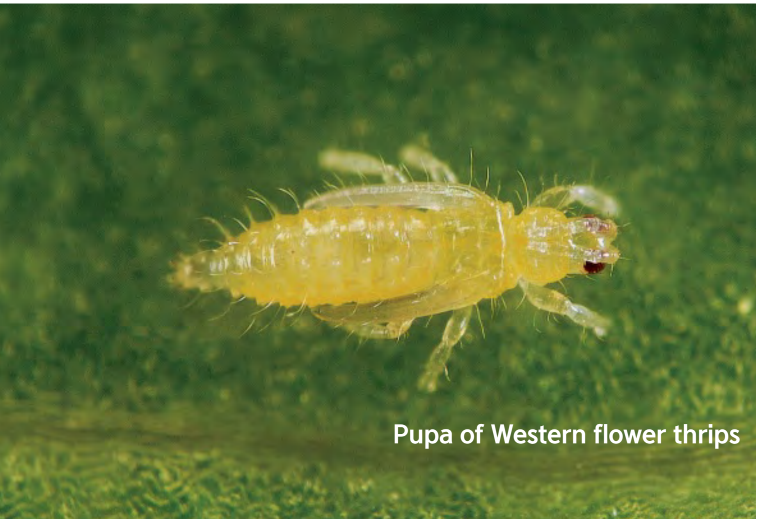
Female adult Western flower thrips



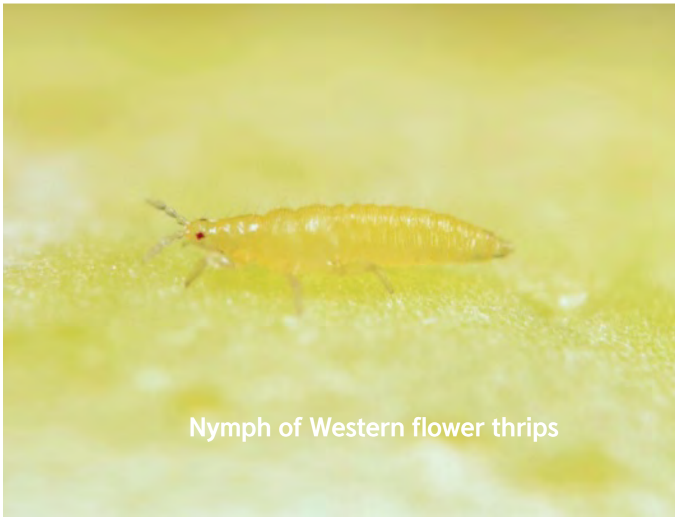
Female adult



Male adult Western flower thrips



Pupa of Western flower thrips



Nymph of Western flower thrips

Frankliniella intonsa

Description

The body length of a female thrip is 1.3-1.7 mm, and the body color is brown or dark brown. And when viewed with the naked eye in the field, it is easily distinguished because it has a darker color, close to the western flower thrips (Frankliniella occidentalis). Their legs are light brown, and fore wings are a light color or light brown. Males have a body length of 1.0 to 1.2 mm, smaller than females, and their body color is consistently yellow, so it is easy to be mistaken for other species when viewed with the naked eye. Adults are 1.0~1.5mm, females are black or dark brown, males are yellow or yellowish-brown. The nymph and pupa are yellow. The first and second Antennal segments are dark brown, and the third and fifth segments are yellow with brown anterior ends. The sixth and eighth segments are dark brown. Eggs, larvae, and pupae have the same shape as western flower thrips.

Life cycle

In the open field, it is commonly found in various flowers from spring to autumn. They occur from the beginning of May, and the highest incidence is from mid-June to mid-July, they winters as adult insects. At 25℃, the egg period is 3 days, the larval period is 4 days, and the pupa period is 3 days. It takes about 10 days from egg to adult. Females live about 50 days and spawn about 500 eggs.

It is a pest that causes significant damage to horticulture crops along with melon thrips (Thrips palmi) and occurs worldwide. Larvae and adult insects are observable with a magnifying glass on the backside of the crop leaves.

Damage

When many adults and nymphs live on a flower, the flower turns blackish brown, resulting in infertility. When thrips damage unripe fruit or mature fruit, white round blemishes appear on the fruit's surface, and the damaged part becomes poorly colored. When adult insects fly to the flower and spawn, white spots appear around the spawning site. When the ovaries begin to enlarge, these white spots swell and become white round patterns.
(National Crop Pest Management System/NCPMS)

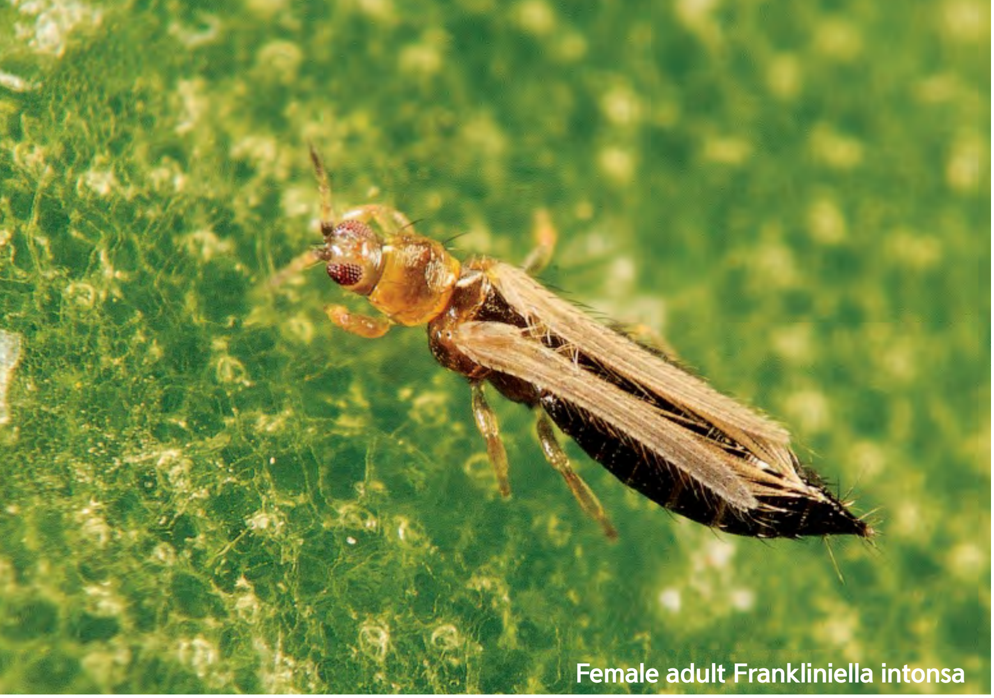
JADAM Natural Control Ratio

Refer to pages 25, 35~37

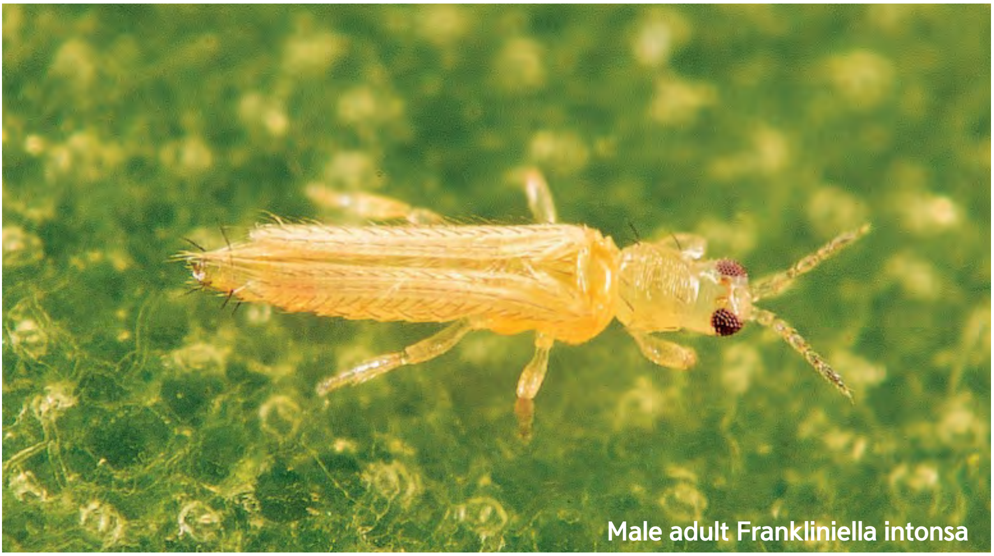
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	**Visible effect**	3 hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Spray inside the flowers, where the Thrips usually live
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

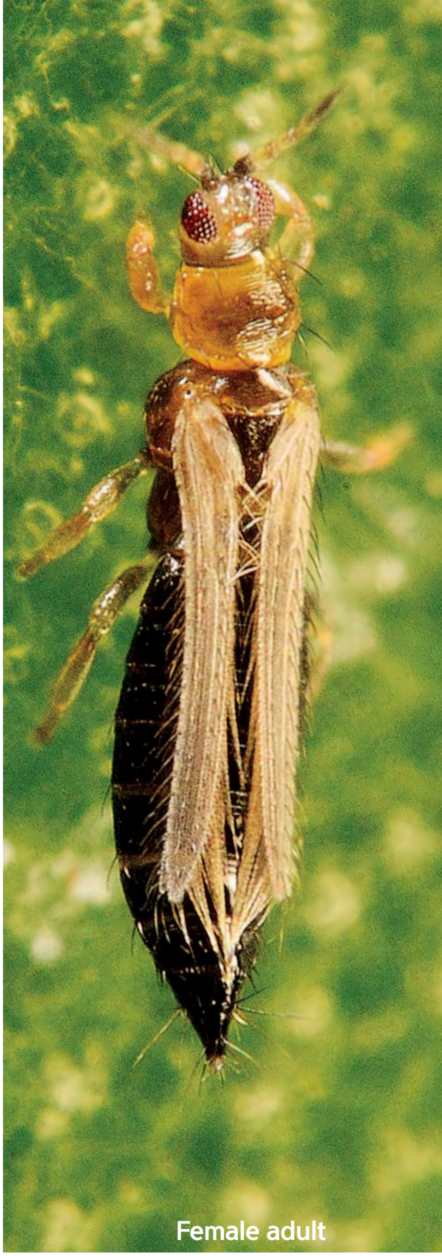
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



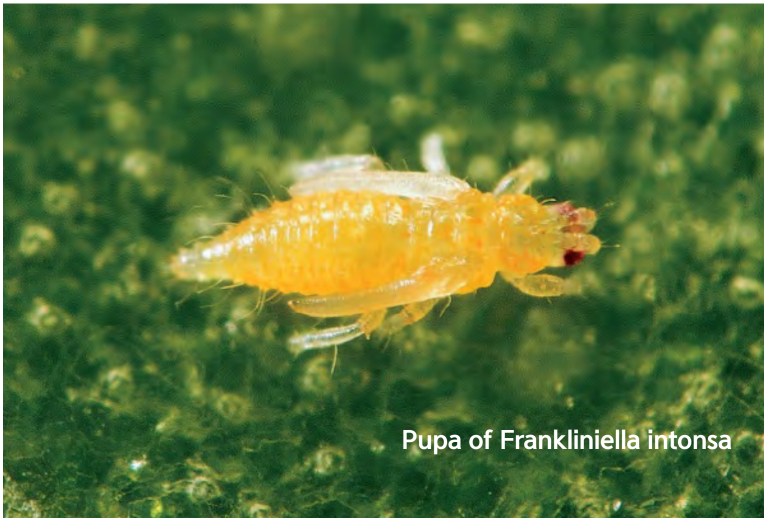
Female adult Frankliniella intonsa



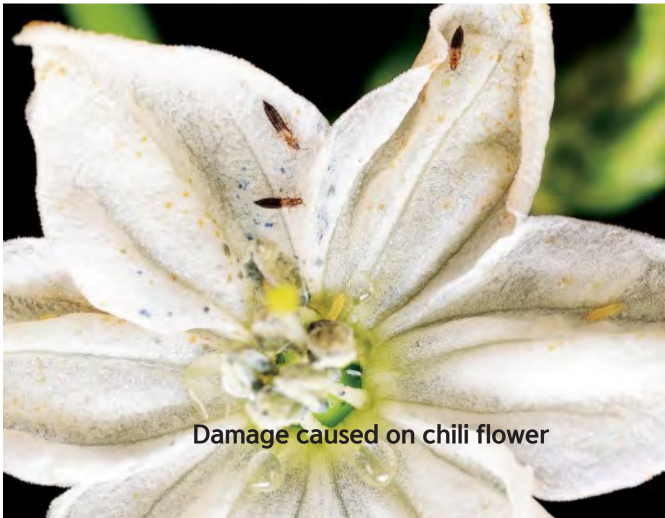
Male adult Frankliniella intonsa



Female adult



Pupa of Frankliniella intonsa



Damage caused on chili flower

Yellow tea thrips

Scirtothrips dorsalis

Description

The body length is 0.8~0.9mm, the body color is yellow, the head is short, the antenna (tactile sensors) is divided into 8 segments, and the third segment is reddish-brown. There are 3-8 reddish-brown bands on the abdomen. The wings are thin and narrow, and there are fine hairs around them.

Life cycle

The developmental ecology is not known in detail but occurs 5-6 times a year, and adults winter under the rough bark of a tree. Their activity starts around the germination period of grapes and occurs in May-June, August, and September. Nymphs are the leading cause of harm, while nymphs injure young leaves, they also damage fruit. Damage on greenhouse grapes is more severe than in the open field. The first generation period is about 15 days, and the lifespan of adults is about 7 days.

Damage

Originally known as a pest of the tea tree, it was recently confirmed to ruin fruit. Damage is remarkably significant during the young fruit period, usually 2-3 weeks from the beginning of fruit falling season. The wound at this time progresses until the time of harvest, creating irregular brown spots on the surface of the fruit, and in severe cases, the surface of the fruit becomes corked and loses its value. Shoots and leaves get harmed when the insect density increases and the wound on the suction side turns brown.

The adult insect winters on grape vines damaging the host plant and affect surrounding tea, ferns, and other weeds. Usually, it reaches the highest density on fruit and shoots around 30-40 days after arriving. In addition to grapes, they also damage tangerines and persimmon trees.

In the case of early damaged fruit, the skin may necrotize in the shape of dark red scabs. In most cases, the navel or the area exposed to sunlight turns gray or dark red. It shows symptoms very similar to the late symptoms of black spot disease.

(National Crop Pest Management System/NCPMS)

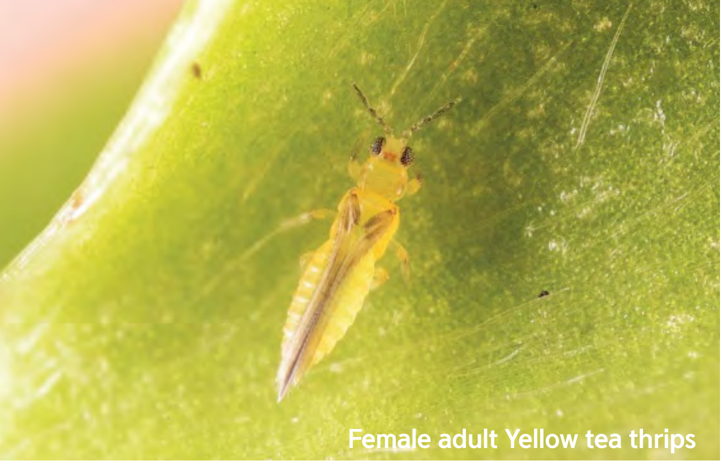
JADAM Natural Control Ratio

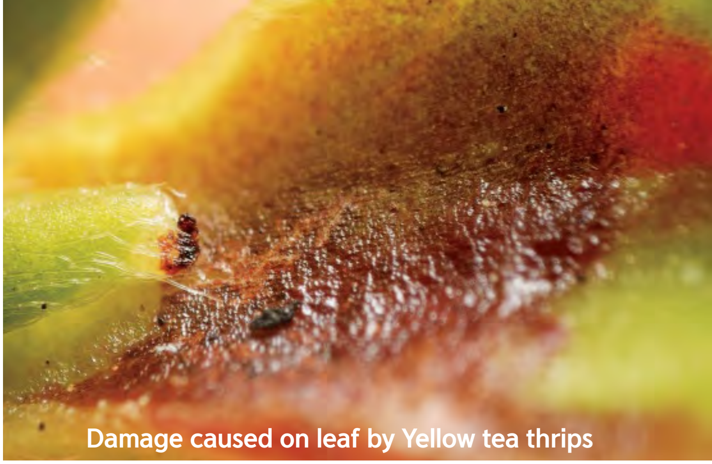
Refer to pages 25, 35~37

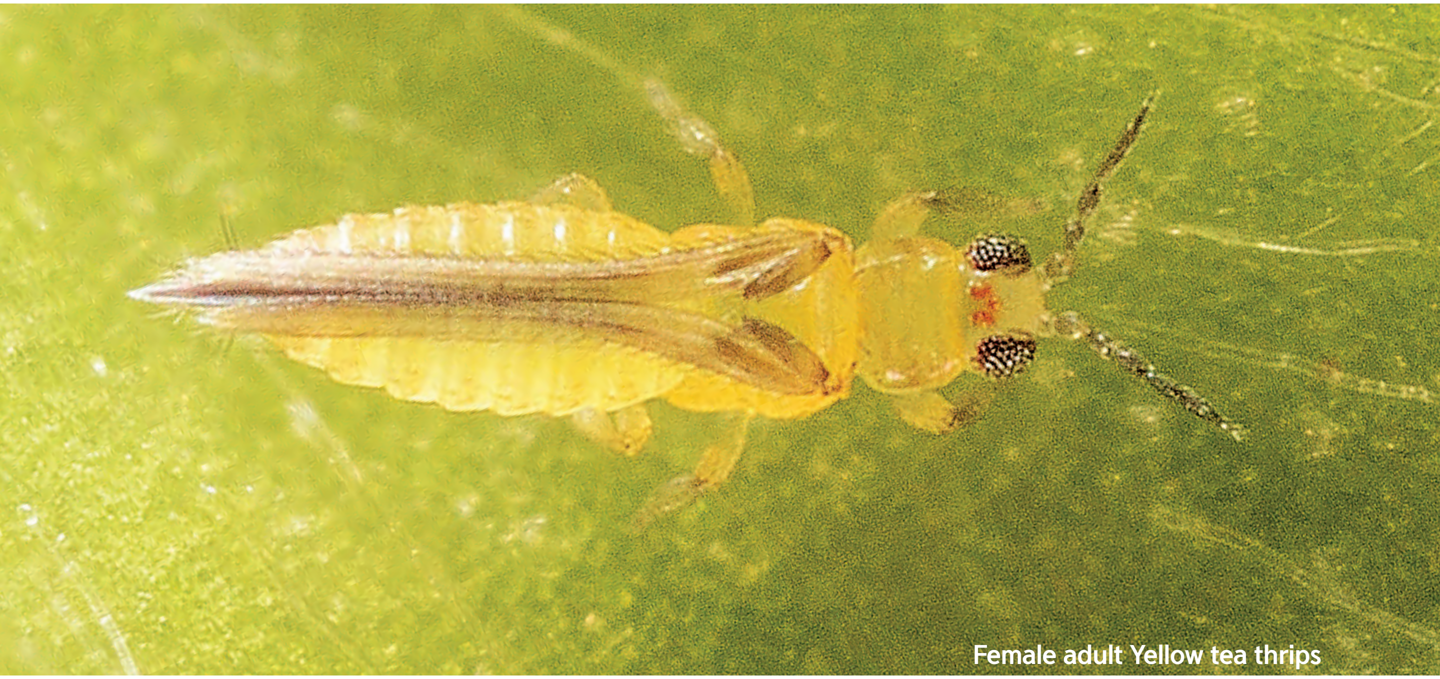
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	**Visible effect**	3 hours

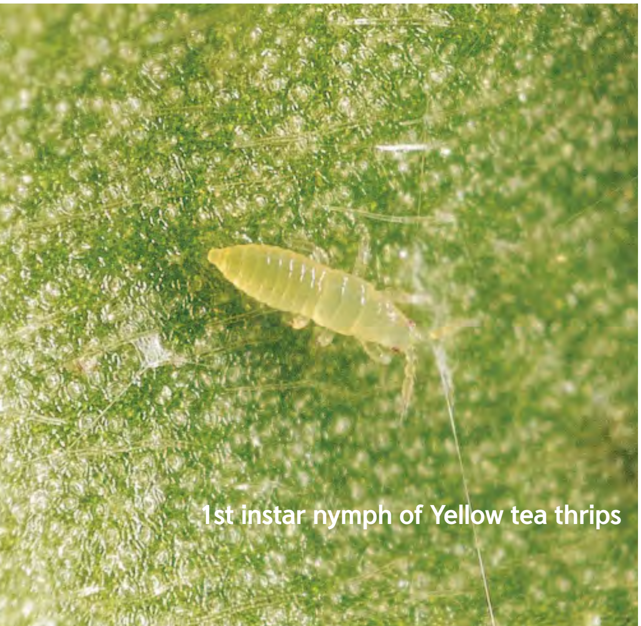
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

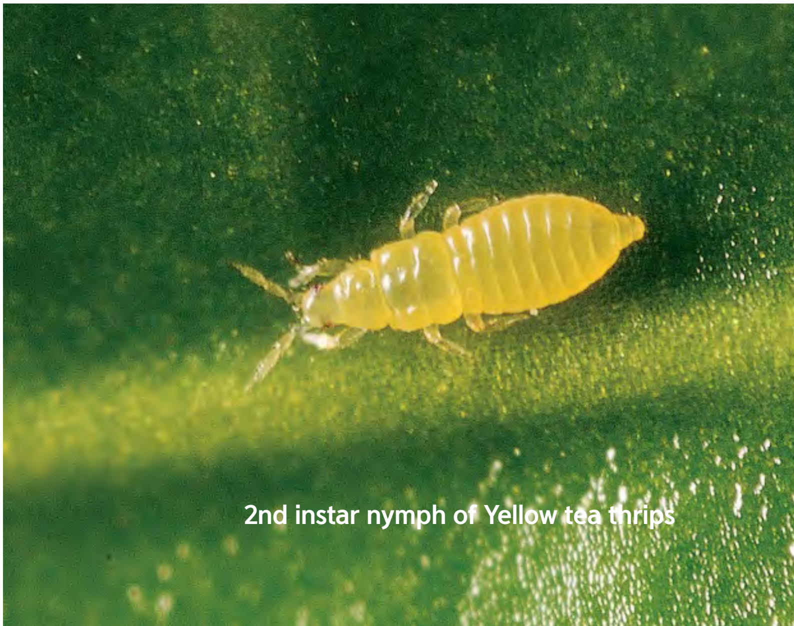
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Female adult Yellow tea thrips


Damage caused on leaf by Yellow tea thrips


Female adult Yellow tea thrips


1st instar nymph of Yellow tea thrips


2nd instar nymph of Yellow tea thrips

Mulberry thrips

Pseudodendrothrips mori

Description

The body length is about 1.6mm. It is distributed in Korea, Japan, Australia, New Zealand, America, and Europe.

Life cycle

They occur 7 times a year and winters as an adult. Both adults and nymphs suck the sap (fluid) of mulberries. After being sucked from small brown spots appear on the mulberry leaves, and water evaporation increases, so the feed value of mulberry decreases. They often occurs during high-temperatures from summer to autumn.

Damage

The quality of mulberry leaves eaten by thrips plays a vital role in the growth and development of silkworm and silk production.The outbreak of pests often affects leaf quality and yield. Thrips cause great difficulty with mulberries, which often becomes severe damage to mulberry trees in all seasons, especially in tropical regions. Almost all popular varieties are susceptible to infection.

They pierce the soft leaf with their mouth and suck the sap, making it appear mottled by numerous stains on the surface. When a large number of pests occur, the moisture and nutrient content of the leaves decreases rapidly. The leaves even become unsuitable for feeding silkworms. The estimated leaf loss due to thrips is about 30-40% of the total production. (N. Sakthivel)

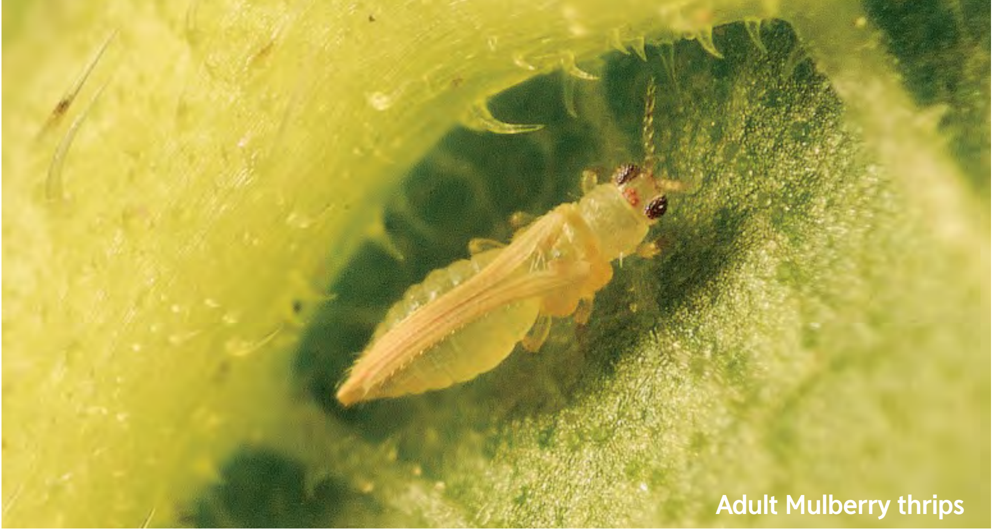
Refer to pages 25, 35~37

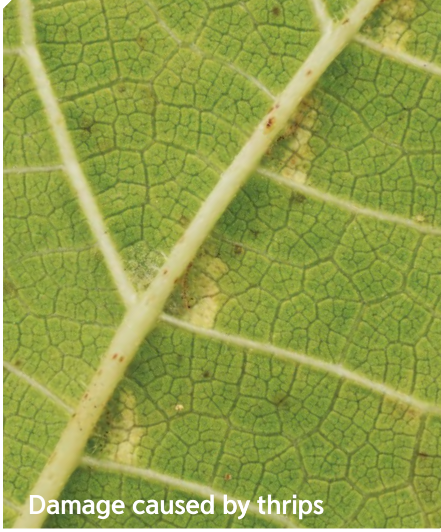
JADAM Natural Control Ratio

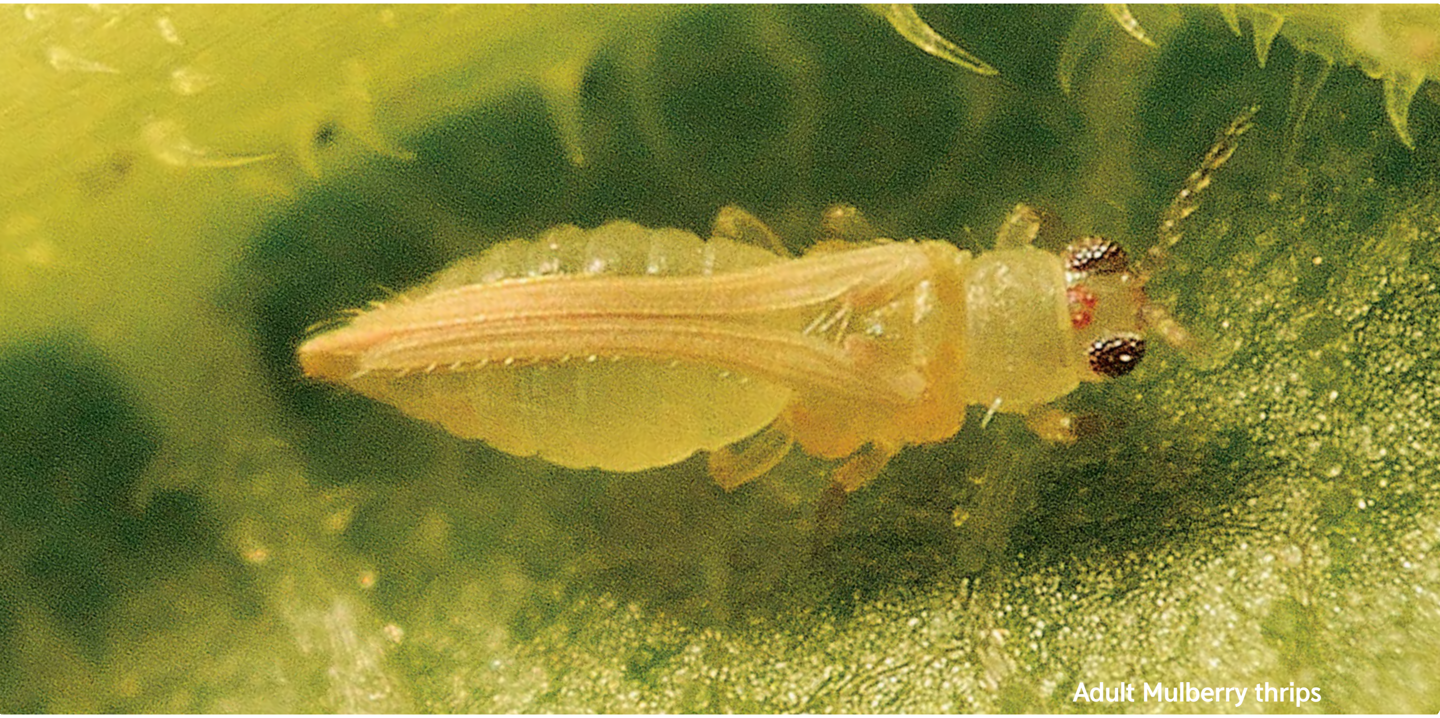
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	7days	**Visible effect**	3 hours

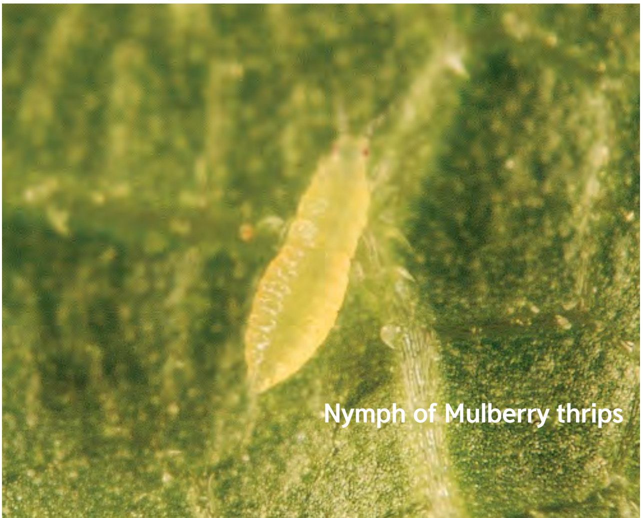
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

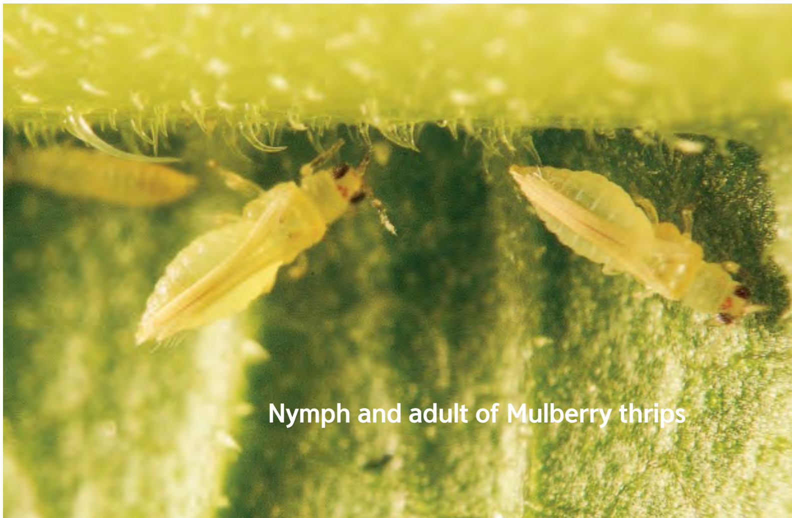
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Mulberry thrips


Damage caused by thrips


Adult Mulberry thrips


Nymph of Mulberry thrips


Nymph and adult of Mulberry thrips

Melon thrips

Thrips palmi

Description

Female adult insects are small, 1~1.4mm in size, yellow, antennae are 7 segments, and from the first to third segments are pale yellow, similar to the body color, and darker from the fourth segment to the end. The male adult insects are generally the same as the female adult insects, but they are 0.8-1.0㎜ in size and have an elongated shape. In general, melon thrips are smaller than western flower thrips, and their whole body is yellow.

Life cycle

The lifespan of adult insects is about 37 days at 20℃ and 28 days at 25℃, and their reproduction is very rapid because they have both monogenesis and bisexual reproduction. They spawn about 100 offspring per adult.

The egg period is 4 to 5 days. When the hatched larvae become a second instar larvae, they fall to the ground and pupate 2 to 3 cm below the soil surface. It takes 14 to 18 days at 25℃ for the first generation to mature. They can have more than 15 generations per year in a greenhouse, and the growth limit temperature is 11 to 12℃. For observation of young larvae and adult insects, use a magnifying glass on the back of a crop's leaf.

Damage

Both larvae and adult insects damage on the leaves, flowers, stems, and even plants' fruits including peppers, eggplants, and potatoes. The young leaves are mainly damaged before flowering. So the damaged shoots appear with brown spots or shrivel to become deformed leaves. When the density increases, even a fully grown leaf turns yellow and eventually drys out.

Thrips love yellow and white, so when cucumbers, peppers, and other plants flower bloom, they rush to the flowers and injure young fruits. The damaged fruit becomes deformed as it grows, and a lot of gray or brown dirty scars remain on the peel of the fruit and lowers product value.

(National Crop Pest Management System/NCPMS)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
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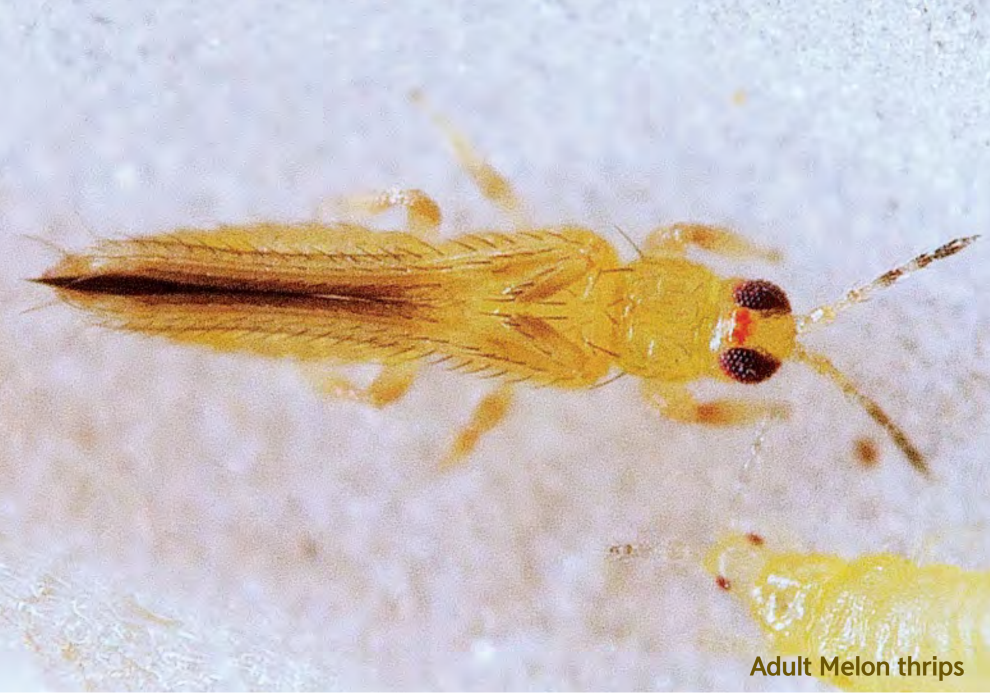
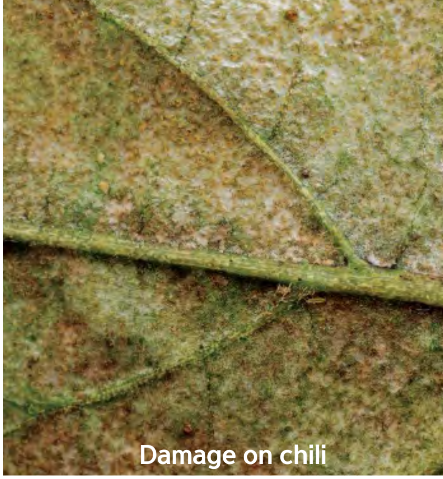
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Spray inside the flowers, where the Thrips usually live
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

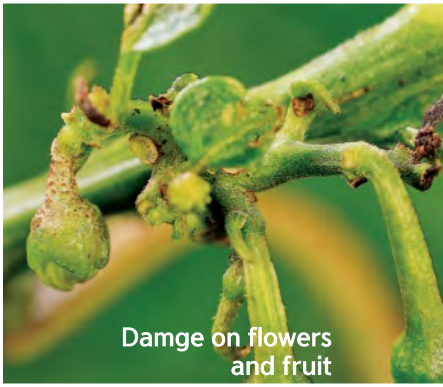
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



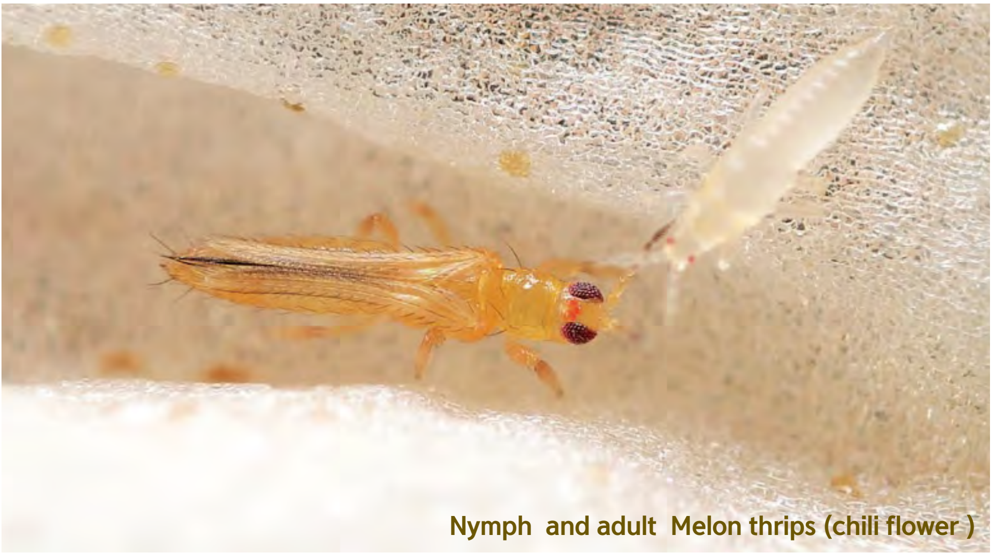
Adult Melon thrips



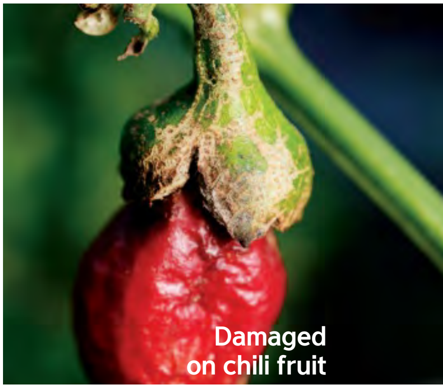
Damage on chili



Damge on flowers and fruit



Nymph and adult Melon thrips (chili flower)



Damaged on chili fruit

Melon thrips (living near the flower)

Melon thrips living inside flower bud (chili)

Onion Thrips

Thrips tabaci

Description

Adults are tiny, about 1.3mm, their body is yellowish-brown to dark brown, and their compound eyes are red. The two pairs of wings are in the shape of a thin stick and have regular long hairs along the edges. When the wings are not in use, they are folded side by side. The egg is 0.3mm in size with banana shape, and it is located implanted into the tissue of plant leaf.

Life cycle

Females place spawning tube into the plant's epidermal tissue and lay 20-170 eggs and they hatch after 5-7 days. The hatched larvae damage by eating the plant's outer shell, then move near the roots 6-7 days after hatching, and molt to become a pupa. The pupa becomes a new adult after 7 days. The lifespan of adults is about 20 days. Adult insects overwinter in the ground near the surface of the affected crop or among weeds. They occur continuously from spring to autumn, but its reproduction system is active in summer. They appears more than 10 times a year. The growth period from egg to adult is 12.7 days at 25℃.

Damage

They live while sucking sap (fluid) of leaves such as green onions, onions, garlic and even cause damage to tobacco. The damaged parts caused by larvae and adults turn yellowish-white. And in severe cases, the plant dries to death. Although it can cause damage by directly ingesting nutrients from plants, it is also known as a disease and virus carrier such as scab on tomatoes. Sometimes, both larvae and adult worms bite human skin. It also damages garden plants' flowers such as potatoes, sweet potatoes, cucumbers, and dahlias. They occur mainly in green onions and occurs in greenhouse crops along with western flower thrips.

(National Crop Pest Management System/NCPMS)

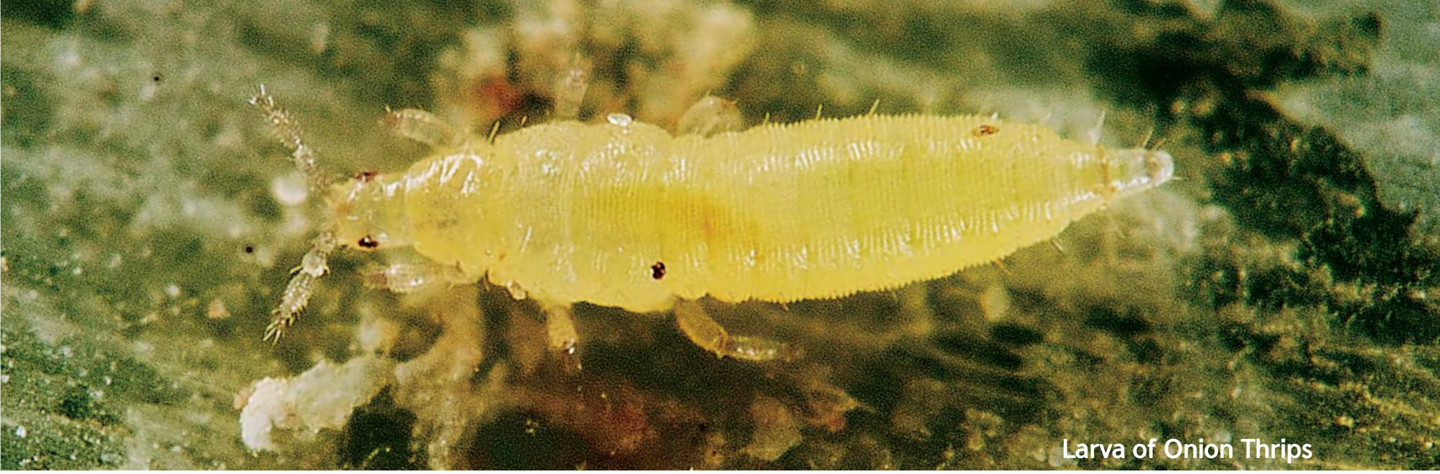
Refer to pages 25, 35~37

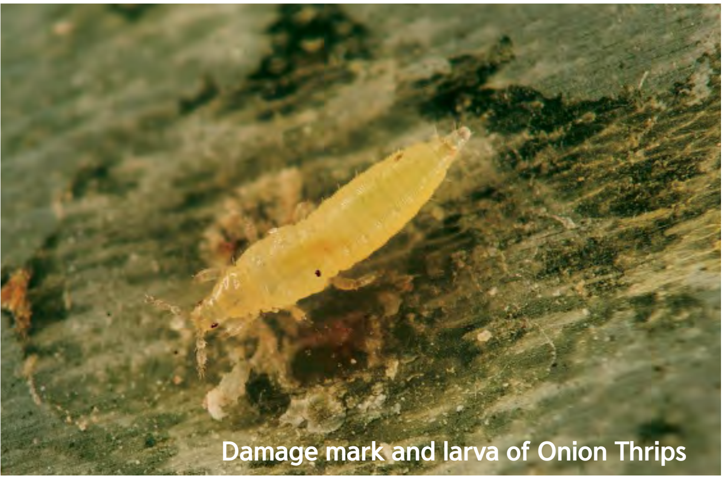
JADAM Natural Control Ratio

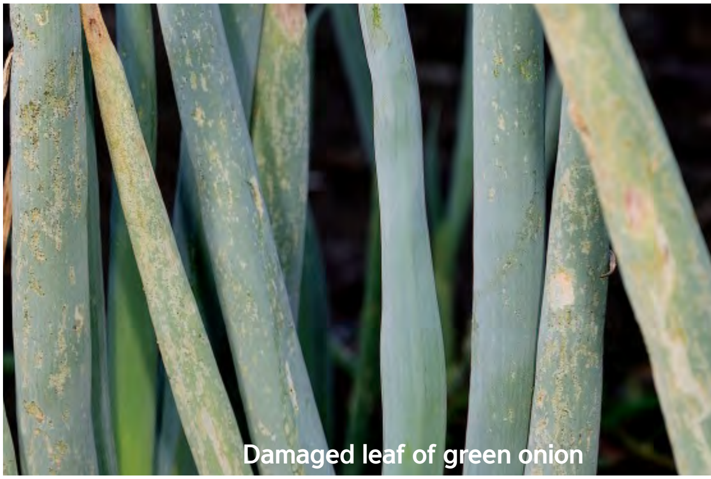
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		600ml	800ml
JMS			
NaOH			40g
Fine soil			60g
Control interval	7days	Visible effect	3 hours

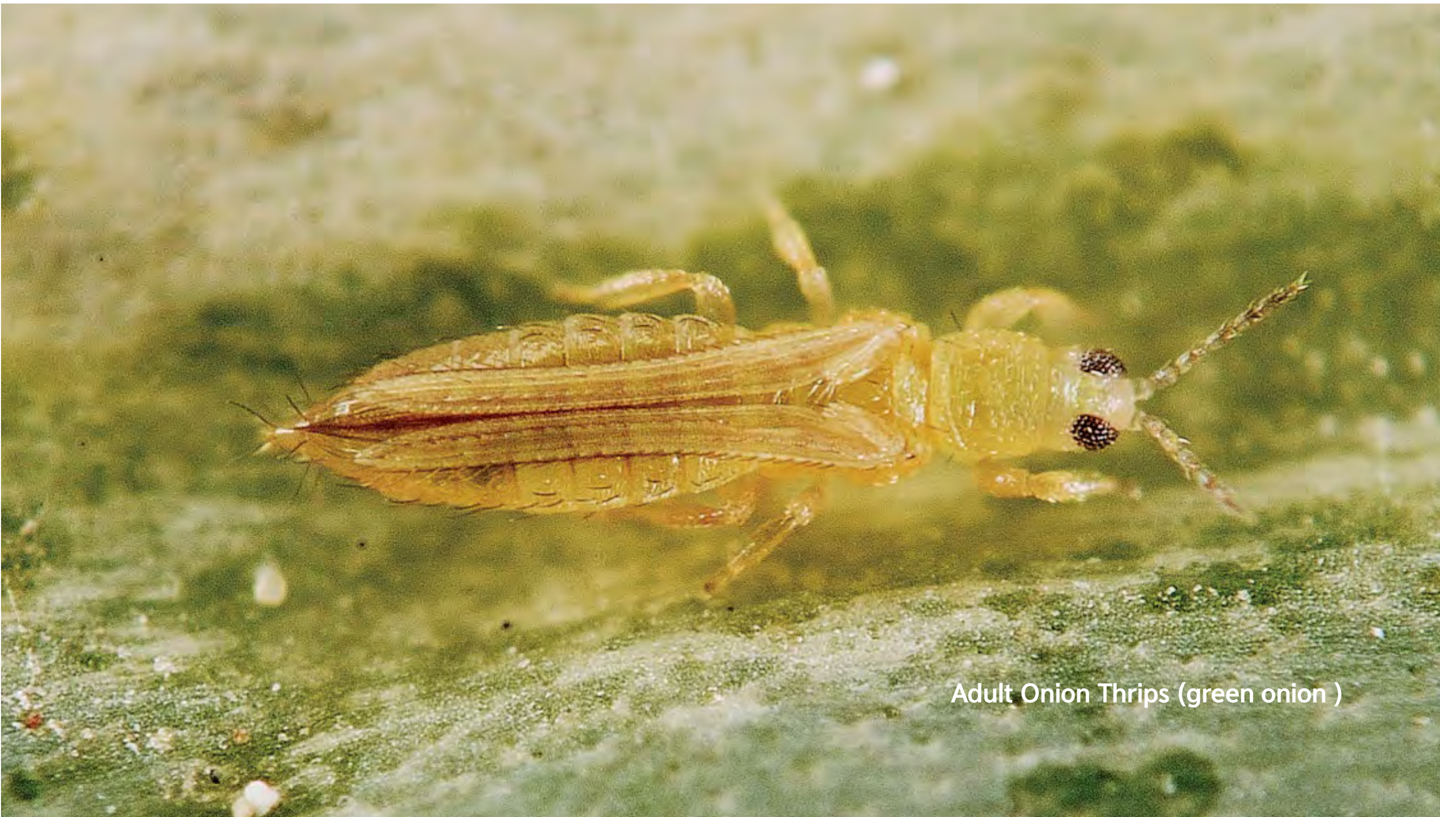
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Larva of Onion Thrips


Damage mark and larva of Onion Thrips


Damaged leaf of green onion


Adult Onion Thrips (green onion)

Scale, Mealybug

Scale insects vary dramatically in appearance, from very small organisms (1–2 mm) that grow beneath wax covers (some shaped like oysters, others like mussel shells), to shiny pearl-like objects (about 5 mm), to animals covered with mealy wax. Adult females are almost always immobile (apart from mealybugs) and permanently attached to the plant on which they are feeding. They secrete a waxy coating for defence, making them resemble reptiles or fish scales, giving them their common name.

Adult females are pear-shaped, elliptical or circular, with no wings, and usually no constriction separating the head from the body. Segmentation of the body is indistinct, but may indicated the presence of marginal bristles. Legs are absent in the females of some families, and when present vary from single segment stubs to five-segmented limbs. Female scale insects have no compound eyes, but ocelli (simple eyes) are sometimes present in Margarodidae, Ortheziidae and Phenacoleachiidae. Adult males in contrast have the typical head, thorax and abdomen of other insect groups, and are no different from females, making pairing them as a species is challenging. They are usually slender insects resembling aphids or small flies. They have antennae with nine or ten segments, compound eyes (Margarodidae and Ortheziidae) or simple eyes (most other families), and legs with five segments. The majority of female scale insects remain in one place as adults, with newly hatched nymphs, known as "crawlers," being the only mobile life stage, apart from the short-lived males.

The reproductive strategies of many species include at least some amount of asexual reproduction by parthenogenesis. Some scale insects are serious commercial pests, notably the cottony cushion scale (Icerya purchasi) on Citrus fruit trees; they are difficult to control as the scale and waxy covering protect them effectively from contact insecticides.
(wikipedia)

Mulberry mealybug

Pseudococcus comstocki

Description

The egg is pink, thin, and long. The size is about 0.5mm. Eggs exist in the white waxy lump of an adult insect. Hatched nymphs are pink to crimson, have well-developed legs, with thin white waxy powder.
As the nymph is molten, its mobility decreases, and the body-color is pink or crimson but looks white because of waxy powder covering the surface. Female adult insects do not have wings and are about 5mm in size. Like nymphs, they are covered with white powder. Adult males have smaller and more transparent wings than females.

Life cycle

They occur 3 times a year on pear trees, and they overwinters as an egg. Wintered eggs hatch from the end of April to the middle of May, and the hatched larvae parasitize on petioles, the base of shoots, pruning spots of small branches, and cracks of large branches. The larvae become adults around the middle of late June, forming egg sacs and spawn.

Larvae invade the protective paper bag farmers put on pears to feed, but when the larva enters the bag, the temperature is higher than the outside of the bag, so the growth is slightly faster. The second adult insects appear from the end of July to the middle of August, and the eggs hatch from the beginning to the end of August, and most of them repeat generations within the paper bag. The third adult insects spawn under the tree bark around the middle of September and overwinter. It is distributed all over the world. It damages crops such as pears, apple trees, tangerines, radishes, ginseng, and ornamental plants. The occurrence of scale insects can be identified when moving ants on a tree is observable.

Damage

They absorb the host plant sap weakening the plant. In severe cases, it dries out the branches or kills the whole tree. And cause discoloration or deformity of the fruit, which decreases product value.

(National Crop Pest Management System/NCPMS)

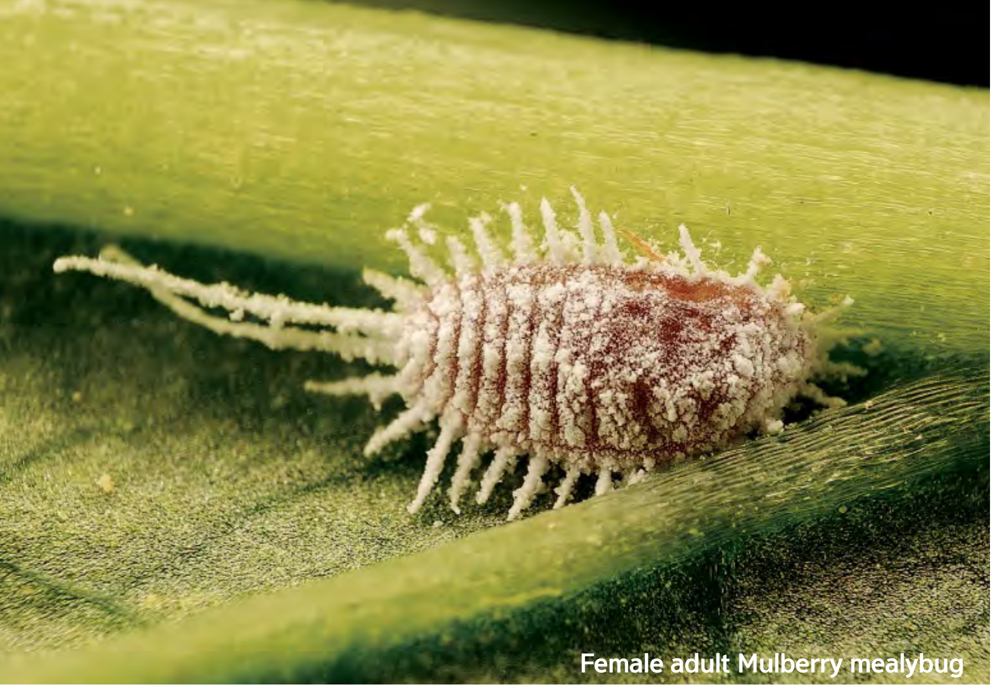
Refer to pages 25, 35~37

JADAM Natural Control Ratio

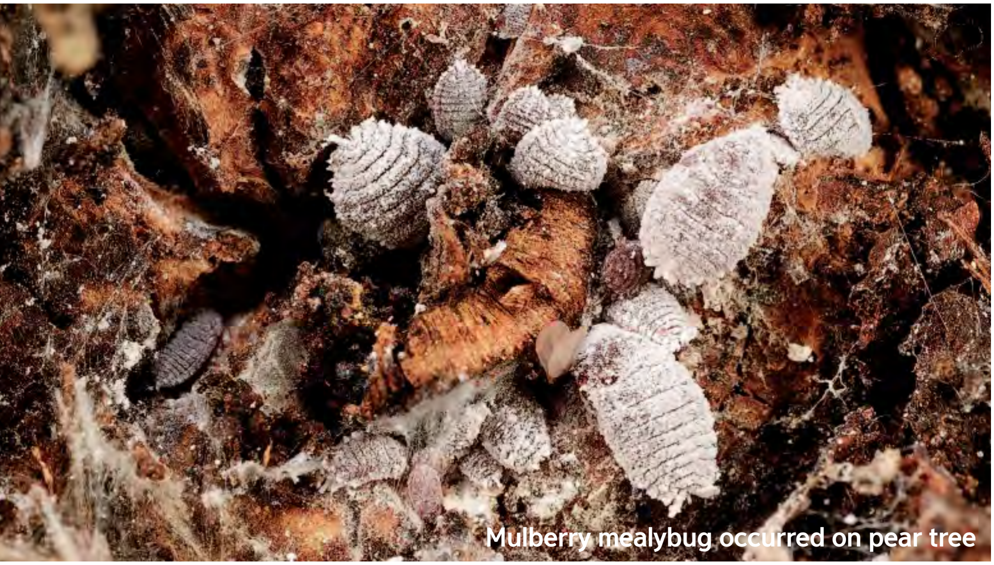
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	3 hours

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 40g instead of JHS.
- Fine soil helps to increase the control effect by infiltrating and fixing pesticides deeply.

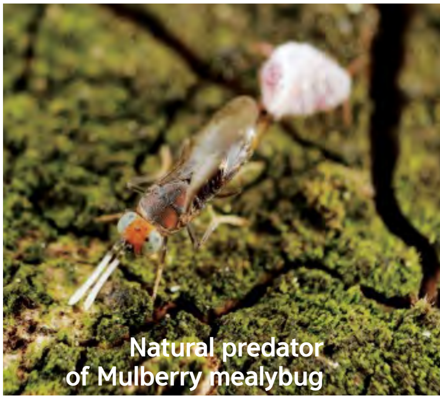
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



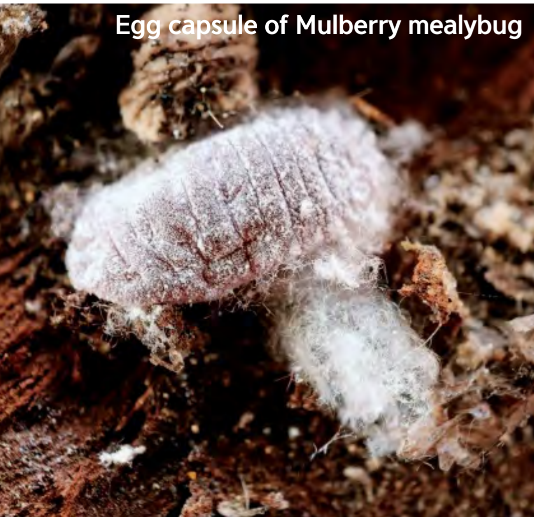
Female adult Mulberry mealybug



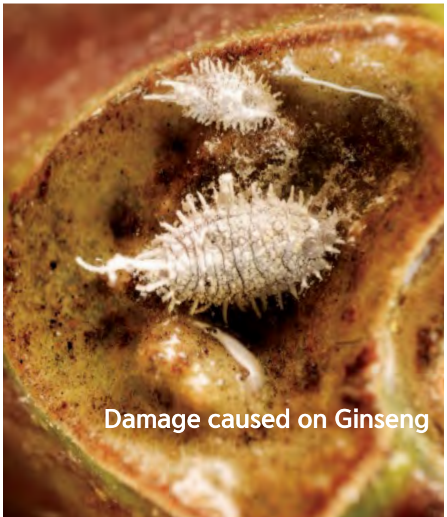
Mulberry mealybug occurred on pear tree



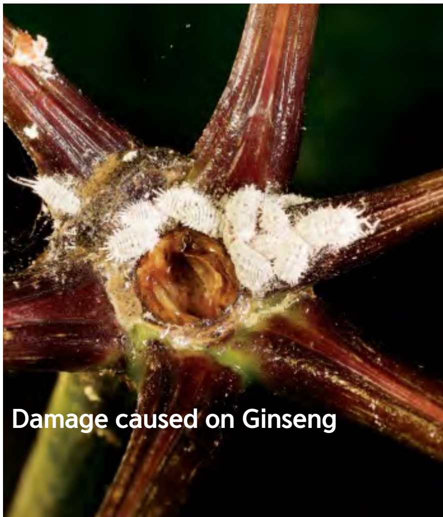
Natural predator
of Mulberry mealybug



Egg capsule of Mulberry mealybug



Damage caused on Ginseng



Damage caused on Ginseng

Asiacornococcus kaki

Description

The female adult body is oval in shape, and length is about 2.0mm; width is about 1.3mm. Conical short and wide thorn hairs are distributed throughout the body, and long conical thorn hairs form the edge of the body. Antennae are short and usually divided into 3 segments, the first and second segments are short and broad, the third segment is the longest.

Life cycle

This scale insect occurs frequently in persimmon trees. They have 2-3 generations a year, and the first hatching is in mid-June and the second is in late August. The overwintered eggs on the bark of persimmon trees wake up from wintering from the end of April, then move to the tree branches, suck on the tree's sap, and continues their life form attached to the tree. After that, when density becomes high, or the branch dies, they moves to another branch.

The appearance of the wax secreted by males and females is completely different. Female adults and nymphs are dark brown and covered in solid white oval pockets, and male adults' pockets are much smaller than females, long and white.

Damage

Its primary food is tree sap, and in severe cases, it dries up leaves and branches causing death, damages fruit, and causes soot disease.

(National Crop Pest Management System/NCPMS)

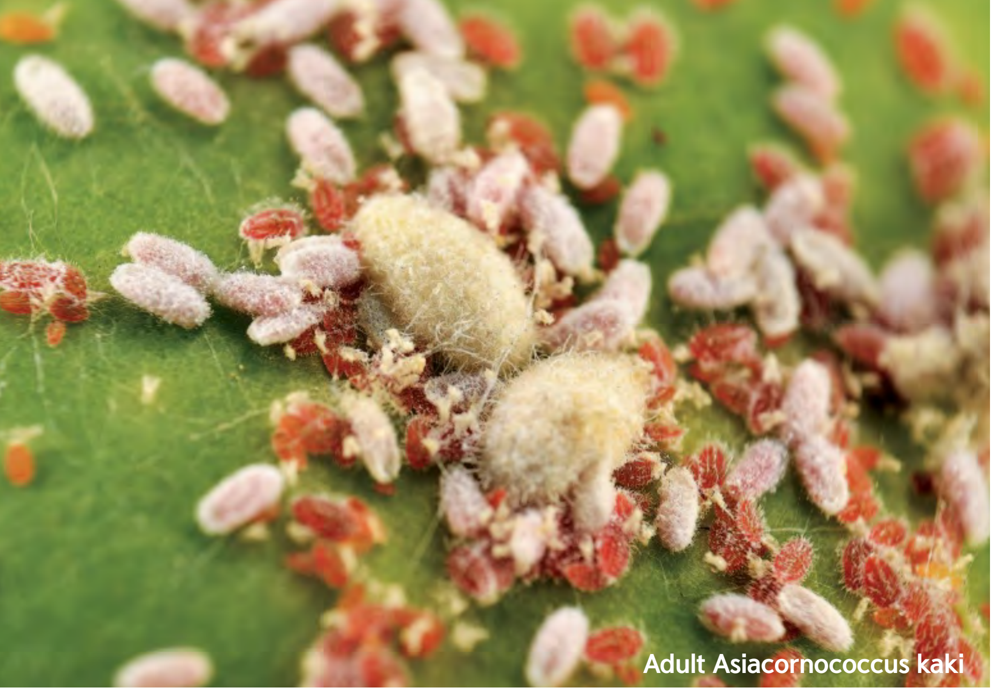
Refer to pages 25, 35~37

JADAM Natural Control Ratio

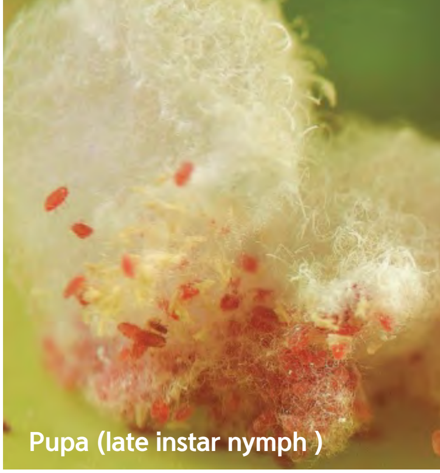
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	400ml	600ml
JHS		400ml	600ml
JMS			
NaOH	80g	40g	60g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

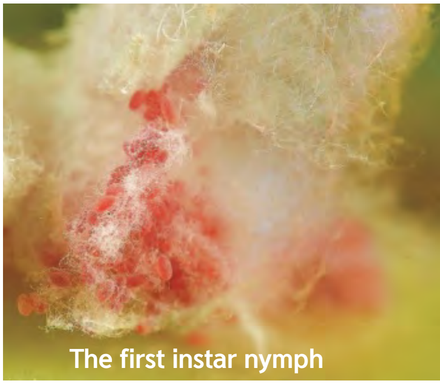
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



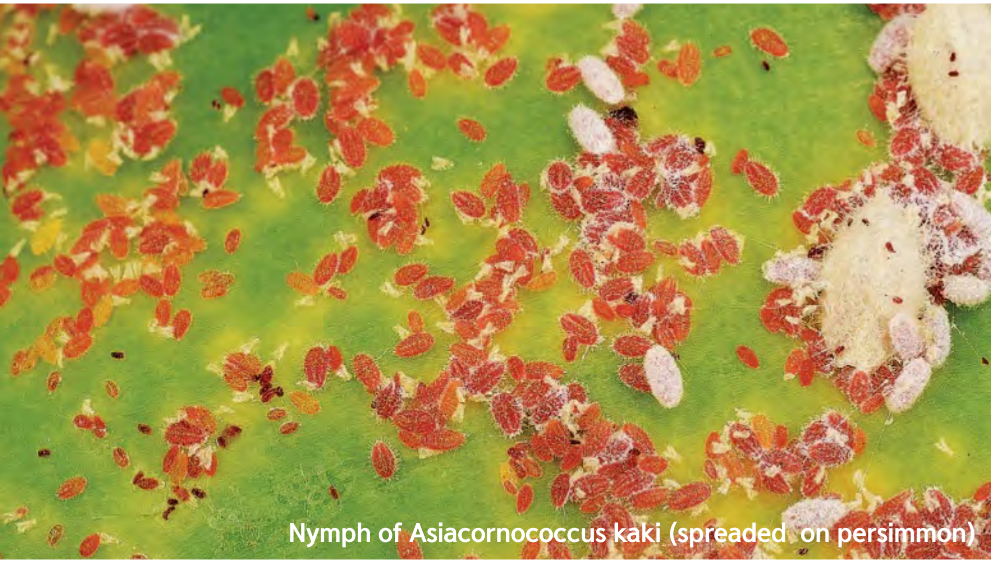
Adult Asiacornococcus kaki



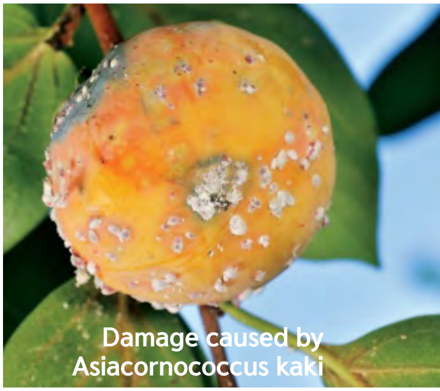
Pupa (late instar nymph)



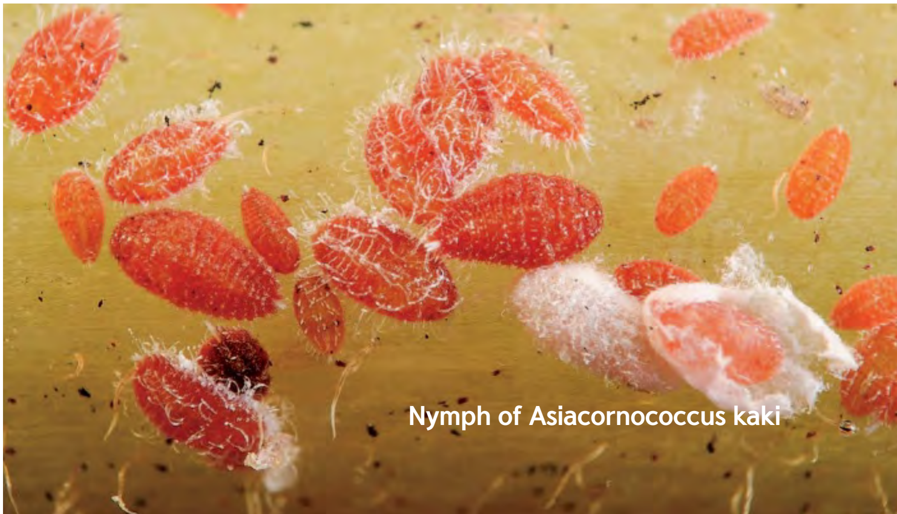
The first instar nymph



Nymph of Asiacornococcus kaki (spreaded on persimmon)



Damage caused by
Asiacornococcus kaki



Nymph of Asiacornococcus kaki

Japanese wax scale

Ceroplastes japonicus

Description

A female adult is about 3-4mm in size and is circular, covered with thick pink-white waxy secretions. The dorsal surface is convex and has shallow grooves. The body is dark purple and has an egg shape, and the wedge with the gate is recessed. The egg is a round shape, reddish-purple, and glossy. Hatched nymphs are flat, round, purple-brown, and secrete beeswax after 5-7 days to form star-shaped pods.

Life cycle

They occur once a year and overwinter as an adult. Spawning begins in early June, and hatched nymphs appear in July. The nymph's growth period is about 20 to 34 days for the first instar, 30 to 40 days for the second instar, and 40 to 54 days for the third instar. At the end of June, it becomes as an adult, and the female prepares wintering after mating, and the male dies after mating. Hatched nymphs initially settle on leaves or green branches to suck the sap. But in autumn, they migrate from leaves to small branches before leaves fall.

Damage

Once it starts to attack the tree, it causes soot disease, which damages the tree's aesthetics. They tend to occur a lot in urban street trees and landscape trees. (Korea National Arboretum)

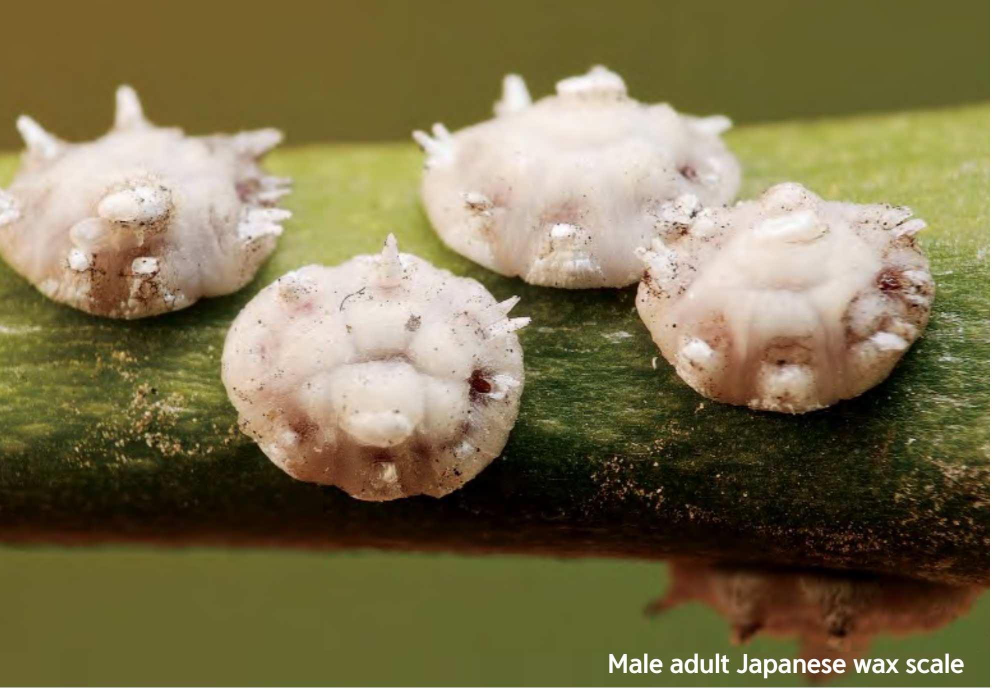
Refer to pages 25, 35~37

JADAM Natural Control Ratio

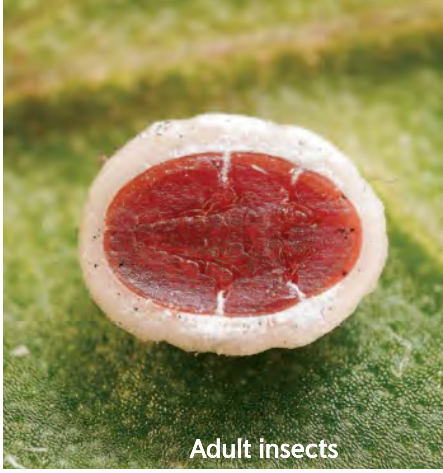
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	80g	40g	60g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

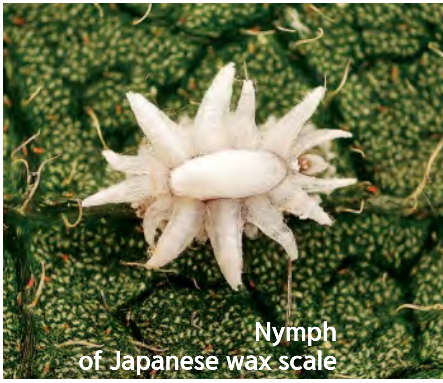
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



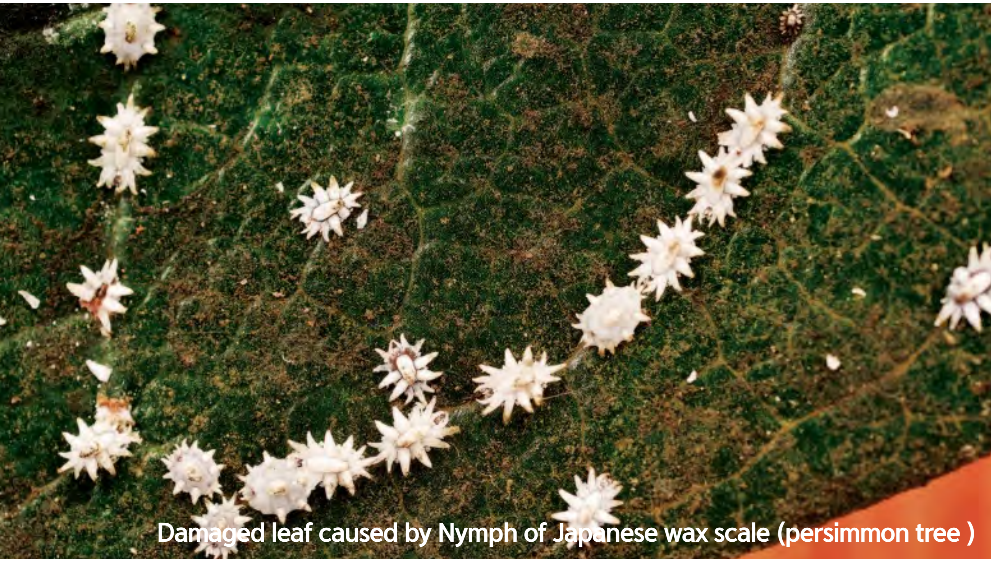
Male adult Japanese wax scale



Adult insects

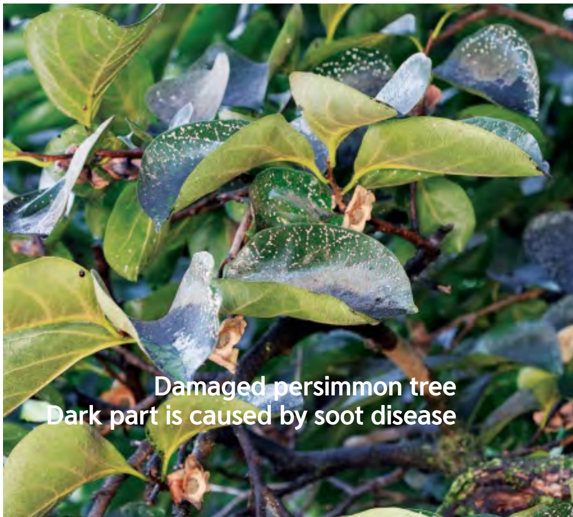


Nymph
of Japanese wax scale



Damaged leaf caused by Nymph of Japanese wax scale (persimmon tree)

Nymph
of Japanese wax scale



Damaged persimmon tree
Dark part is caused by soot disease

Cottony cushion scale

Icerya purchasi

Description

The female adult body is about 5mm long and about 3mm wide. It has a wide egg-shaped body, a flat abdomen, convexed back. The female insects are reddish-brown, lightly covered with beeswax powder on the back, and long beeswax fibers are irregularly distributed.

The antennae are divided into 11 segments, but there are 10 segments, slightly tapering to the tip. Each segment has black feathers. The eyes are hemispherical, large, and located behind the antennae. The eggs are in a white bag-shaped pouch of waxy material and spawn in 600-1,000 eggs.

Life cycle

Newly hatched first-instar nymphs are 0.6-0.7 mm long and 0.3-0.4 mm wide. They are bright red overall, the legs and antennae are black. About 10 days after hatching, a bright yellow, swollen waxy substance begins to form on the back.

The first instar nymphs molt and become a second instar nymph, and it is 2.2mm long and 1.3mm wide, while the third instars have a body length of 3.0mm and a body width of 1.6mm.

Damage

It sticks its needle to suck the plant's sap. The damaged tree weakens, and the excrement causes soot disease, impeding the assimilation operation, and lowering the fruit's product value. When the damage is severe, trees may die.

(National Crop Pest Management System/NCPMS)

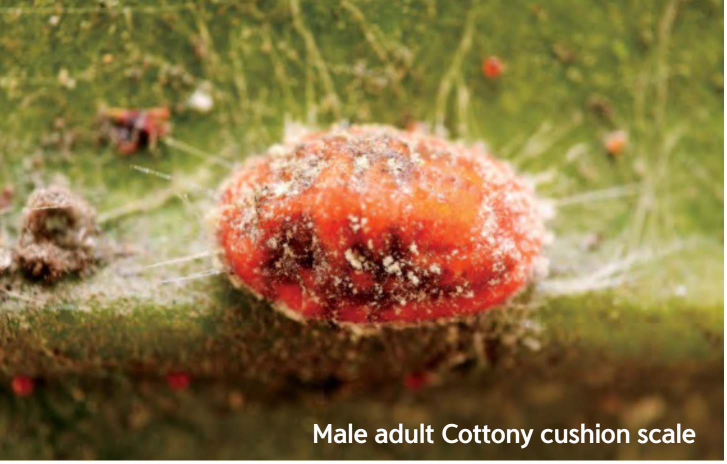
JADAM Natural Control Ratio

Refer to pages 25, 35~37

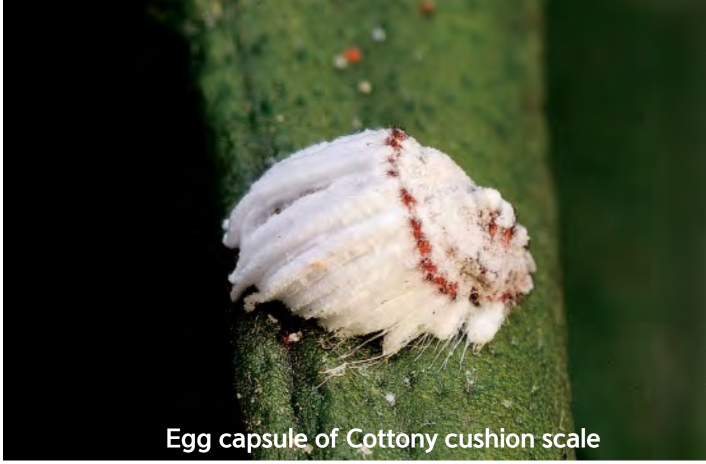
Standard (20L)	**Winter Control**	**Infestation**	**Emergency**
JS	80ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	80g	60g	80g
Fine soil	80g	60g	80g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

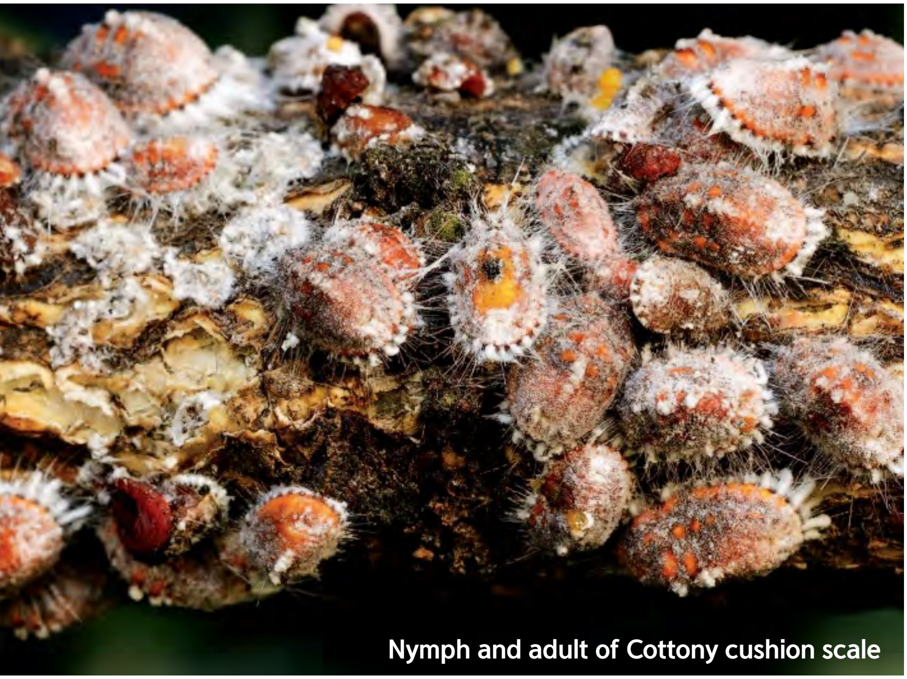
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



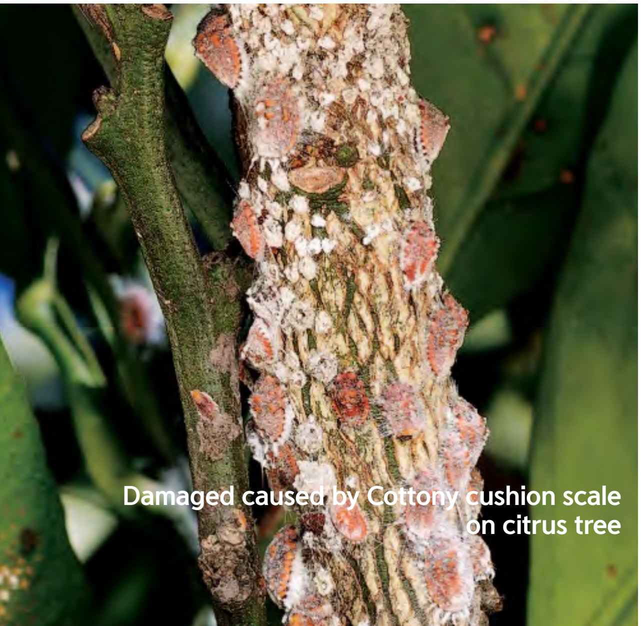
Male adult Cottony cushion scale



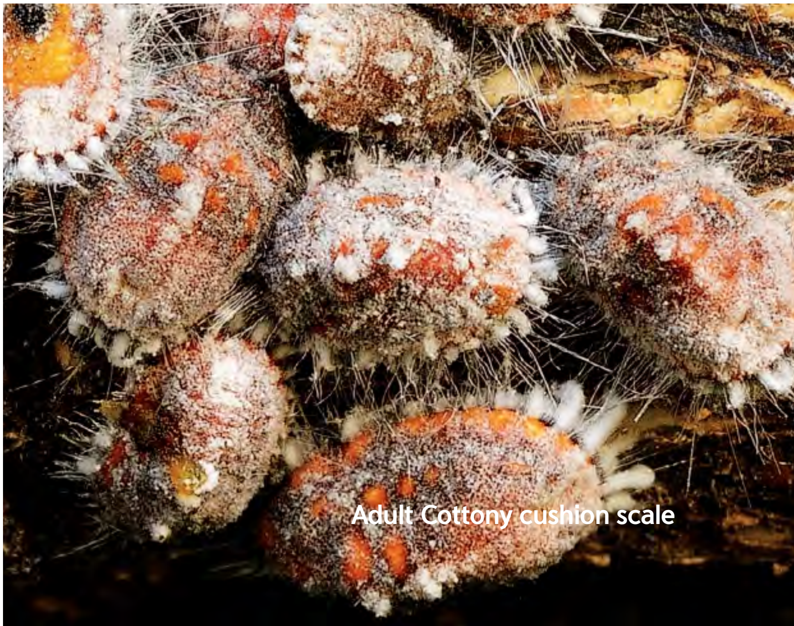
Egg capsule of Cottony cushion scale



Nymph and adult of Cottony cushion scale



Damaged caused by Cottony cushion scale on citrus tree



Adult Cottony cushion scale

Hemispherical scale

Saissetia coffeae

Description

The female's body length is 2~3mm, the butterfly is 1.5~2.0mm, and the height is about 2mm. It has a hemispherical shape with a raised dorsal surface. The body color is matt dark reddish-brown. It secretes white beeswax powder on the back and appears a little outside the edge of the pod. The antenna (tactile sensors) are divided into 8 segments, the third segment is the longest, and the second segment and the end segment are the next longest. The sixth and seventh segments are the shortest and almost the same length. There are many long setae on the tip, and there are only 1 to 2 short setae on the remaining nodes.

The three pairs of legs are almost the same shape, and the length of the ankle joint is two-thirds of the calf joint. The toenails are short, thick, and slightly curved. The crest wedge is shallow and has 3 crest hairs, and the central one is the largest. There are 6 long setae on the anal ring, and 3 setae are small, and there are 3 setae at the end.

Life cycle

The first Instar has an oval body and a flat back. The body color is light yellow and glossy but disappears when it becomes an adult. The antennae are divided into 7 segments and 3 pairs of legs are well developed. The base wedge is deep, and a pair of tricots is large and has 1 long setae at the end. They occur about twice a year. Since most of them monogenesis, males are rare and spawn 300-400 eggs depending on the adult's size.

Damage

It is omnivorous and is parasitic on leaves and small branches of houseplants and occurs mainly on cycads in greenhouses. In the greenhouse, adults and nymphs can be seen throughout the year. They occur occasionally and causes significant damage. It sticks to the stem, sucks the sap, and causes soot disease with its excrement. (Doosan Encyclopedia)

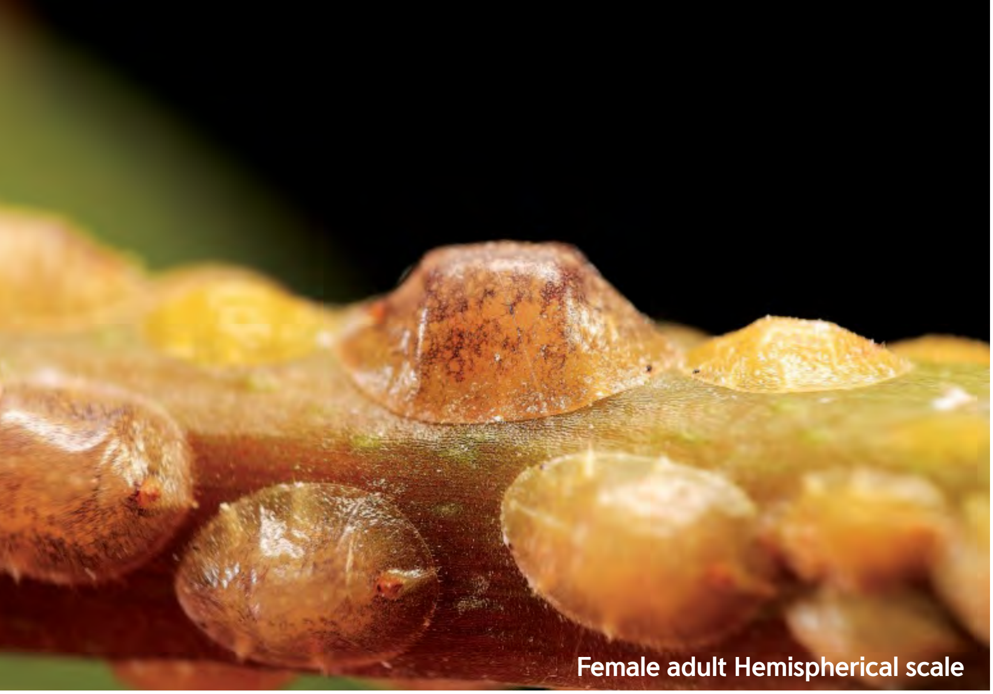
JADAM Natural Control Ratio

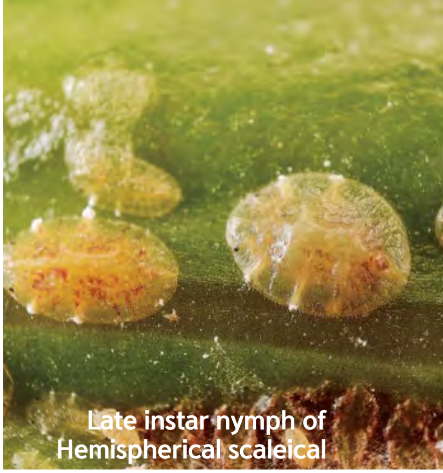
Refer to pages 25, 35~37

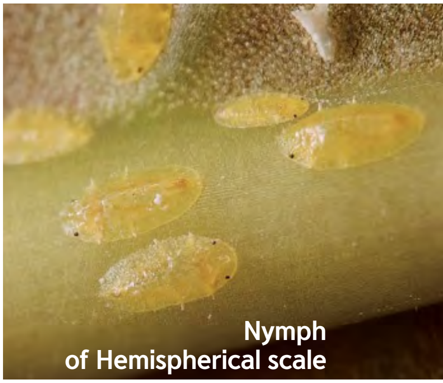
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	80g	40g	60g
Fine soil	80g	60g	60g
Control interval	10days	**Visible effect**	1~2days

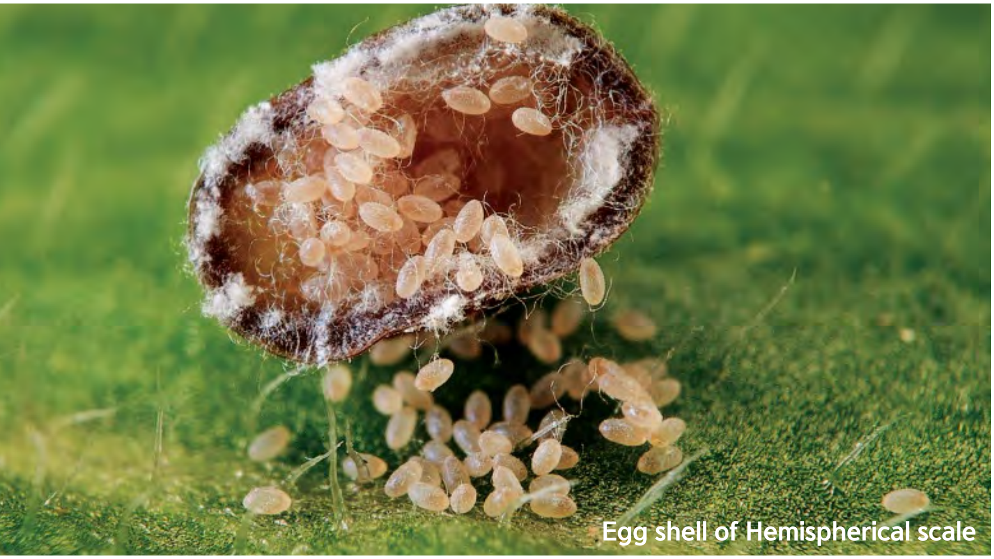
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

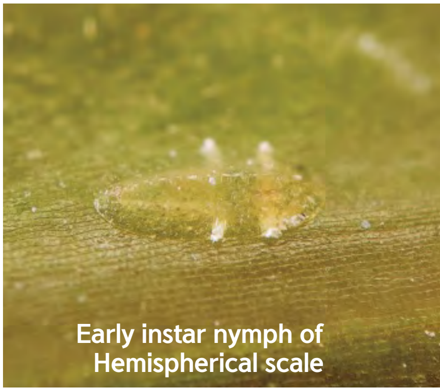
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

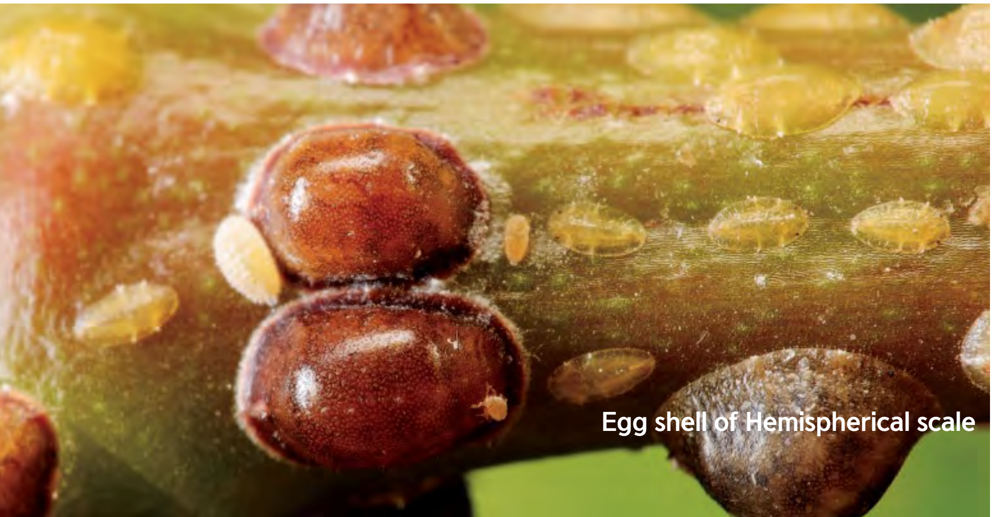

Female adult Hemispherical scale

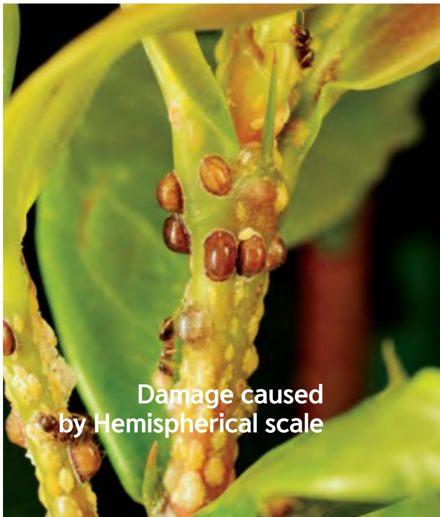

Late instar nymph of
Hemispherical scaleical


Nymph
of Hemispherical scale


Egg shell of Hemispherical scale


Early instar nymph of
Hemispherical scale


Egg shell of Hemispherical scale


Damage caused
by Hemispherical scale

Coffee scale, Green scale

Coccus viridis

Description

Coccus viridis is a soft scale insect in the family Coccidae with a wide host range. It is commonly known as green scale or sometimes coffee green scale because it is a major pest of coffee crops throughout the world. The adult scale insect is a glossy pale green colour with black internal markings that are visible through the chitinous body wall. It has a flattish elongated oval dome shape and is about 3mm in width. The front end is rounded while the rear end has a distinctive groove. Adults retain their legs and antennae but mostly remain sedentary. The nymphs are a flattish oval shape, yellowish green, with six short legs. The nymphs shed their skin three times and each instar is larger and more convex than the previous one.

Life cycle

Males have not been recorded for this species so the populations are composed entirely of females. A mature female lays whitish oval eggs and keeps them underneath her body to protect them. She usually chooses the underside of a leaf and adult scales may often be seen in a line on both sides of the midrib and beside the lateral veins. Eggs hatch in anything between a few minutes to a few hours. The newly hatched crawlers wander off to find somewhere suitable to settle on a leaf or near the tip of a green shoot. Both nymphs and adults suck sap from the phloem of the host plant.

Damage

When a large number of scale insects are present, their collective feeding causes a yellowing of the leaves which may later fall, a loss of plant vigour and a reduction in crop yield. The scale insects excrete honeydew on which bees, wasps, ants and other insects feed. Sooty mould fungus often grows on the honeydew and this decreases the area of leaf available for photosynthesis, spoils the appearance of the plant and reduces the marketability of fruit. (wikipedia)

JADAM Natural Control Ratio

Refer to pages 25, 35~37

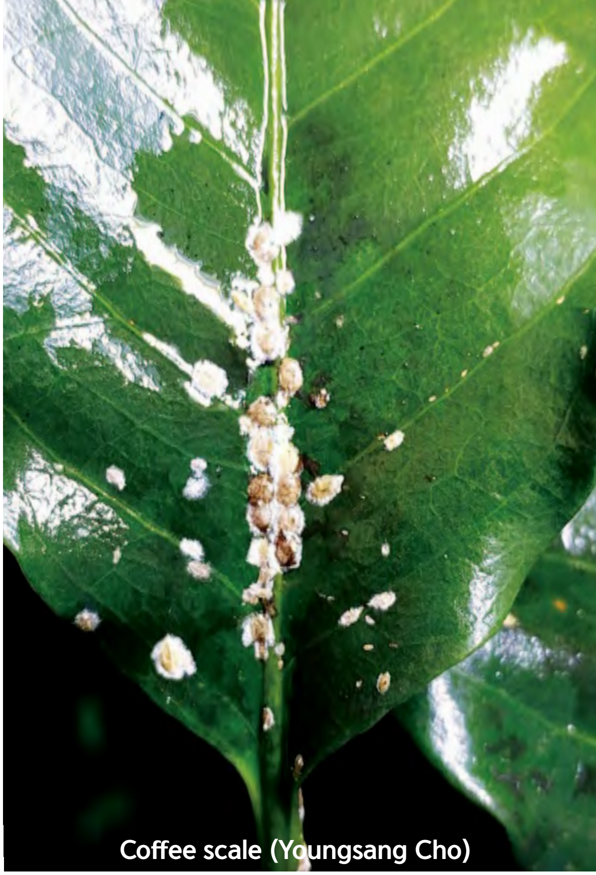
Standard (20L)	Winter Control	Infestation	Emergency
JS	60ml		
JWA	400ml	500ml	600ml
JHS			
JMS			
NaOH	80g	40g	60g
Fine soil	80g	60g	60g
Control interval	10days	Visible effect	1~2days

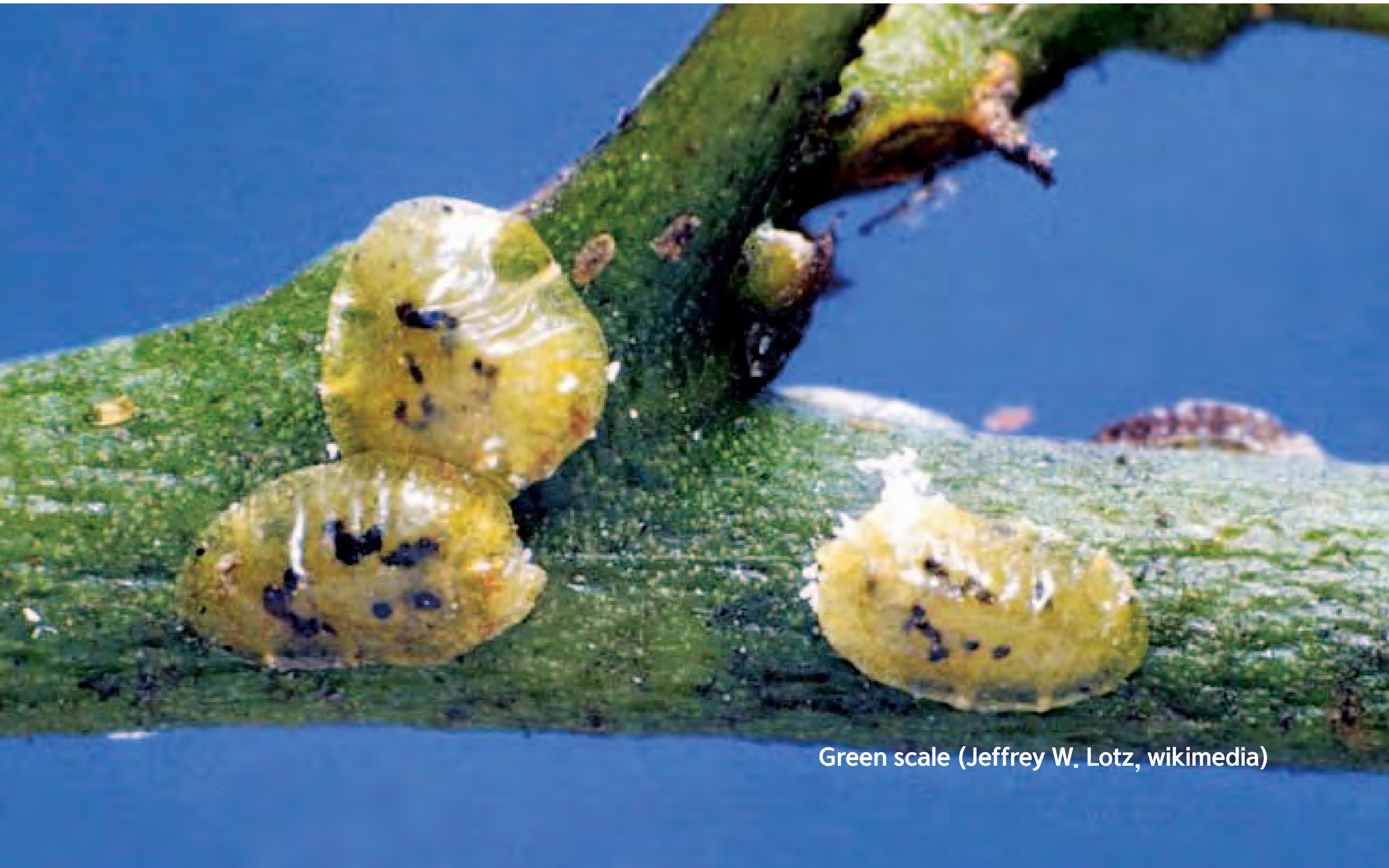
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

Youngsang Cho studied coffee berry boer (CBB) control method in Hawaii for one year.

Coffee (Youngsang Cho)


Coffee scale (Youngsang Cho)


Green scale (Jeffrey W. Lotz, wikimedia)

Arrowhead scale

Unaspis yanonensis

Description

The female adult scale is 2.8-3.6mm long, 1.4-1.9mm wide, dark brown, and has a shape similar to an arrowhead. The scale has a raised central part and sloped on both sides forming a roof shape.

The female adult scale is dark yellow, 2.5mm long, 1.0mm wide, long in shape, and the body is divided into nodes. The head faces the pointed side of the scale and pierces into the plant. Male adult insects are in the form of small flies with wings that have changed completely from their younger bodies, the body length is 0.5mm, the length of the wingspan is 1.8mm, the body is bright orange, and the tactile sensors and legs are dark yellow.

Life cycle

It winters mainly as adults, and first-generation first-instar larvae occur in mid-May. The spawning of females lasts for an extended period of about 2 months. The larvae move immediately right after hatching but soon settle and do not migrate to another area. After the larvae have passed the second instar, the adult scale develops in early May, and the second generation first instar occurs in late July. In some regions, the third generation larvae develop from late September to October. It is when the second or third-generation larvae develop when the nymphs migrate to the fruit.

Damage

It parasitizes on leaves or branches, and the tree dies. If it parasitizes on fruits, the parasitic area loses color and if control is neglected, the hypertrophy worsens, and the product value is lowered. Arrowhead bugs are a less dangerous pest on the citrus farm, but once they occur, they spread very rapidly, and they are parasitic at high density, which is the most significant cause of trees drying out. If you left unattended for 2 to 3 years, the damage is severe enough to close the orchard. The appearance of white scales (white stalks) on leaves or stems is a symptom of high-density male scale occurrence.

(National Crop Pest Management System/NCPMS)

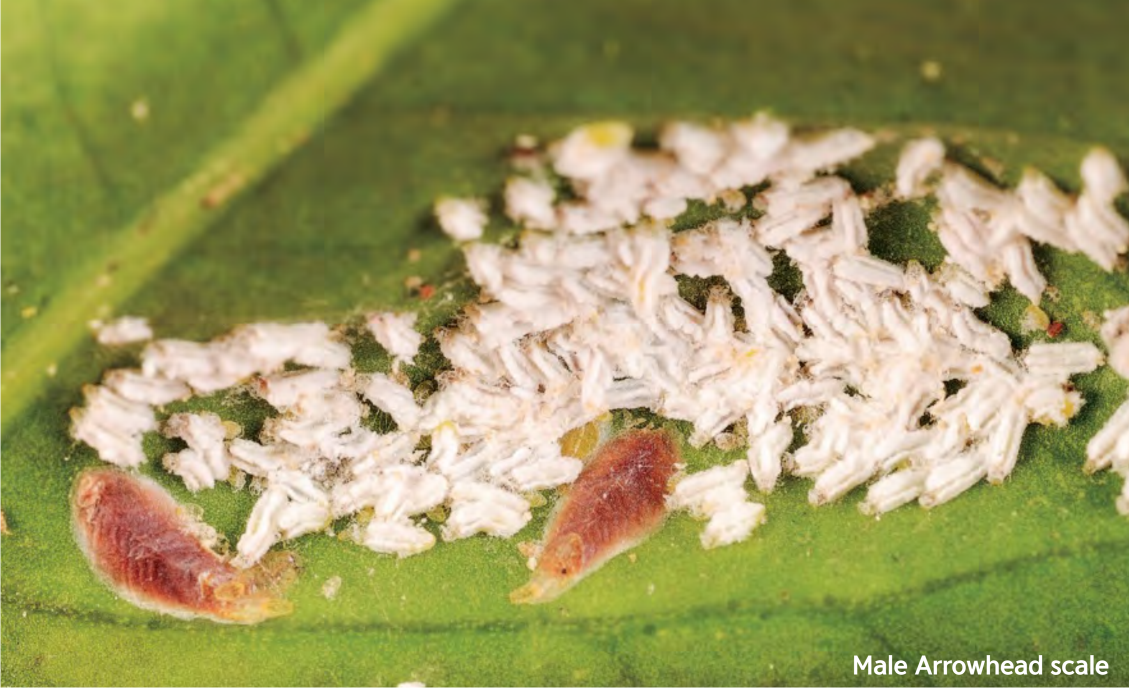
JADAM Natural Control Ratio

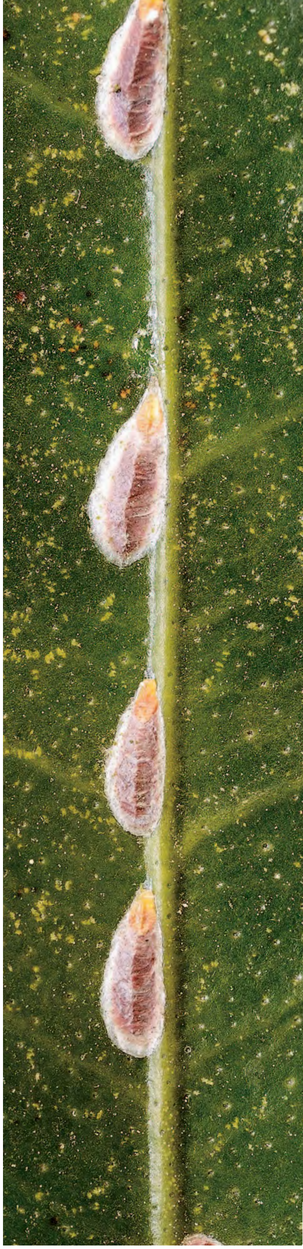
Refer to pages 25, 35~37

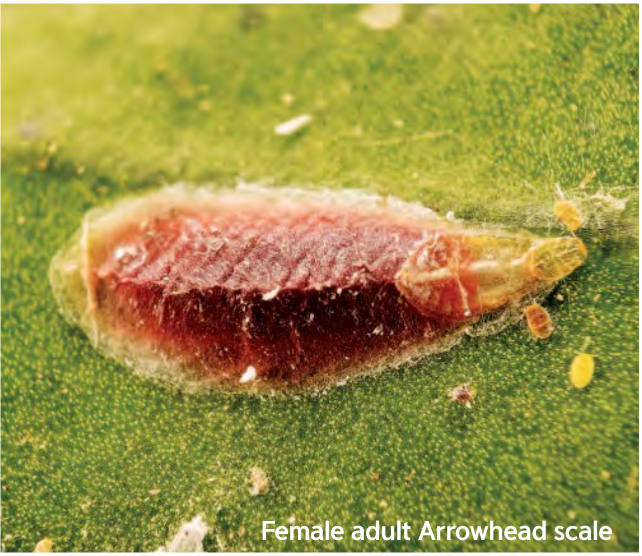
Standard (20L)	Winter Control	Infestation	Emergency
JS	60ml		
JWA	400ml	500ml	600ml
JHS	400ml	500ml	600ml
JMS			
NaOH	80g	40g	60g
Fine soil	80g	60g	60g
Control interval	10days	**Visible effect**	1~2days

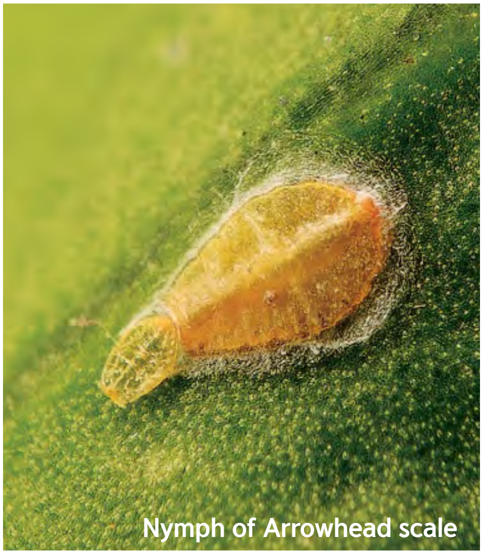
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add sodium hydroxide (NaOH) when the pest is stick on plants.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

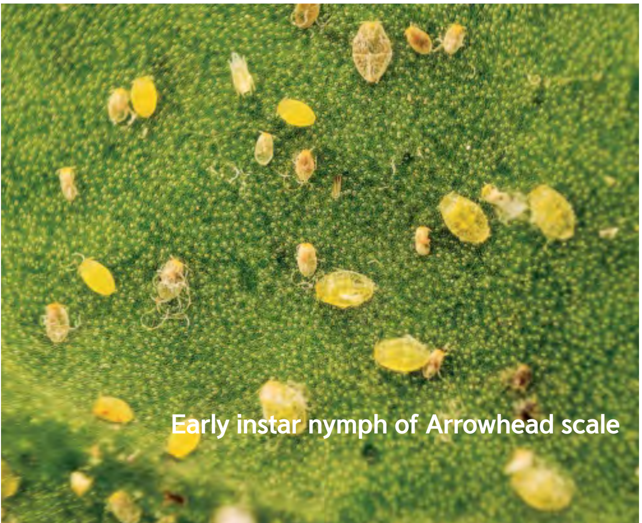
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

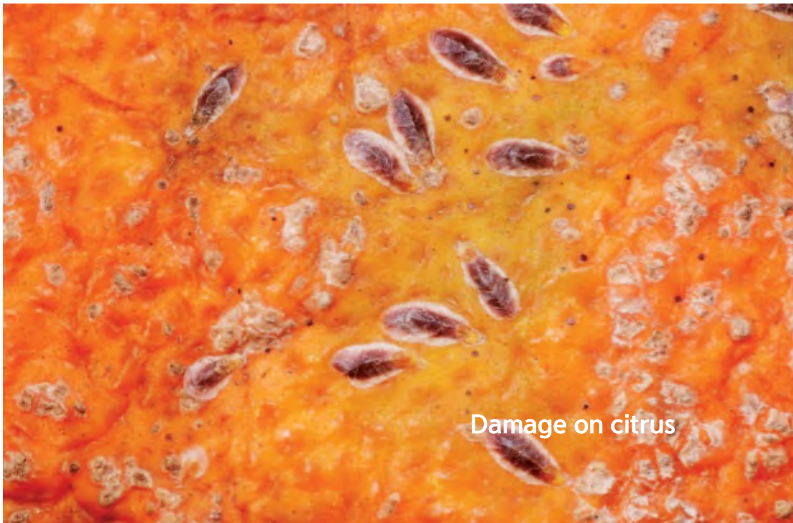

Male Arrowhead scale

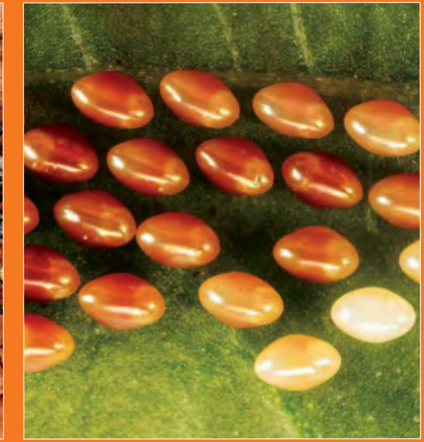



Female adult Arrowhead scale


Nymph of Arrowhead scale


Early instar nymph of Arrowhead scale


Damage on citrus



True bug, Stink bug

Body sizes range from the smallest 1.1mm to the largest 65mm. The shape of the body is also varied, such as a flat plate shape, a long rod shape, and an unusual shape with the wings deformed and enlarged. Most of the body color is green or dark brown, which serves as a protective color to protect itself from predators.

The head is generally wide, and many things are close to a triangle. The mouth frame is suitably adapted to suck in, but the big and small jaws are like a long and thin needle. Eyes are large and well developed, and there are two or no eyes. The antenna (tactile sensor) is 4-5 segments, the stink bug that lives on the ground is long, and the one that lives in water is short.

Some species parasitize on vertebrates. It is also carnivorous, usually eating plant sap or sucking the blood of other insects. There are many essential bugs for crops, and some types belong to hygiene insects. On the other hand, there are also beneficial species that eat pests. (Doosan Encyclopedia)

Legume stink bug

Piezodorus hybneri

Description

The female adult is 9.8 mm long, and the male adult is 8.7 mm, which is larger than that of the male. It is very similar to the green stink bug (Nezara antennata Scott), but it is small and has a horizontal line pattern on the pronotum. The nymphs go through a 1-5 instar process, and the female adult lifespan is 53 days. The male adult insects are about 38 days. The total number of spawn is around 450~500, and spawn on bean leaves are rows of two in pods.

Life cycle

It was known to be distributed mainly in the southern regions of South Korea, but due to climate warming, the distribution area has now been found to have risen to the central region. It is known as a major pest of legumes along with the bean bug (Riptortus clavatus). (Deogkee Park)

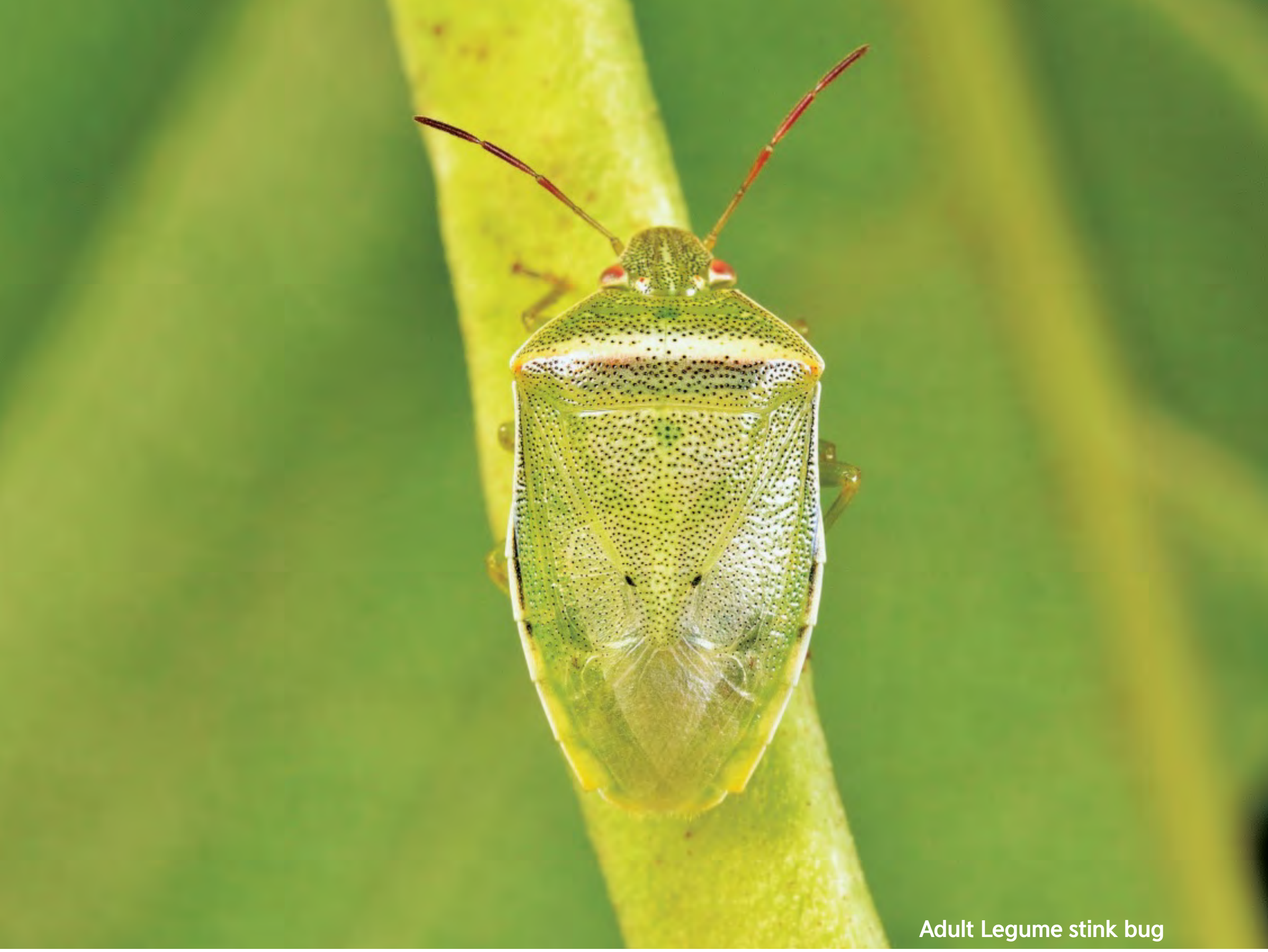
Refer to pages 25, 35~37

JADAM Natural Control Ratio

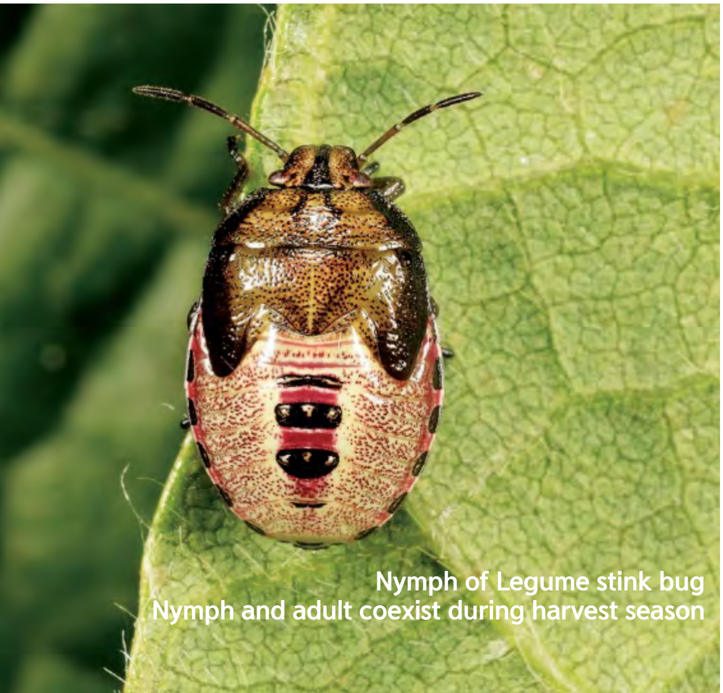
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		500ml	800ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

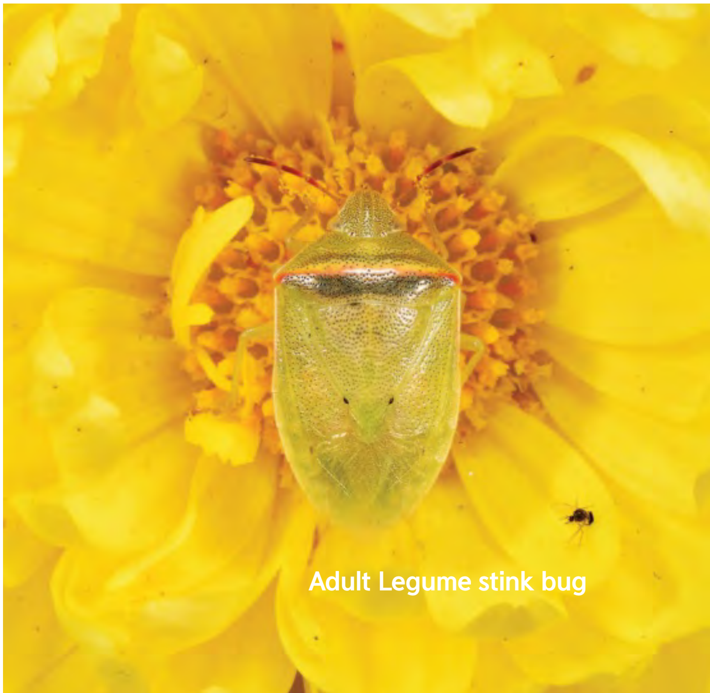
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Legume stink bug



Nymph of Legume stink bug
Nymph and adult coexist during harvest season



Adult Legume stink bug

Winter cherry bug

Acanthocoris sordidus

Description

The body length is 10 to 13.5mm. The color of the body is blackish-brown with a uniform matt gray color on the back. There are dense gray upside-down hairs on the surface of the body, and there are also black straight-set hairs. The head is small, and the antenna (tactile sensor) consists of 4 segments, and the second segment is the longest. The anterior thorax dorsal surface is inclined to the front, and there are light-colored vertical lines along the midline.

The lower side of the body and legs are lighter than the back but slightly reddish. The thigh is thick and has a small spiny section outside of the upper end and a sharp spiny section on the inside. The dorsal surface of the abdomen is dark red.

Damage

It is parasitized on crops such as pepper, paprika, goji berries, poisonous grass, black pepper, sweet potatoes, and convolvulus. It dramatically weakens the crop through the absorption of sap on the stem. (Doosan Encyclopedia)

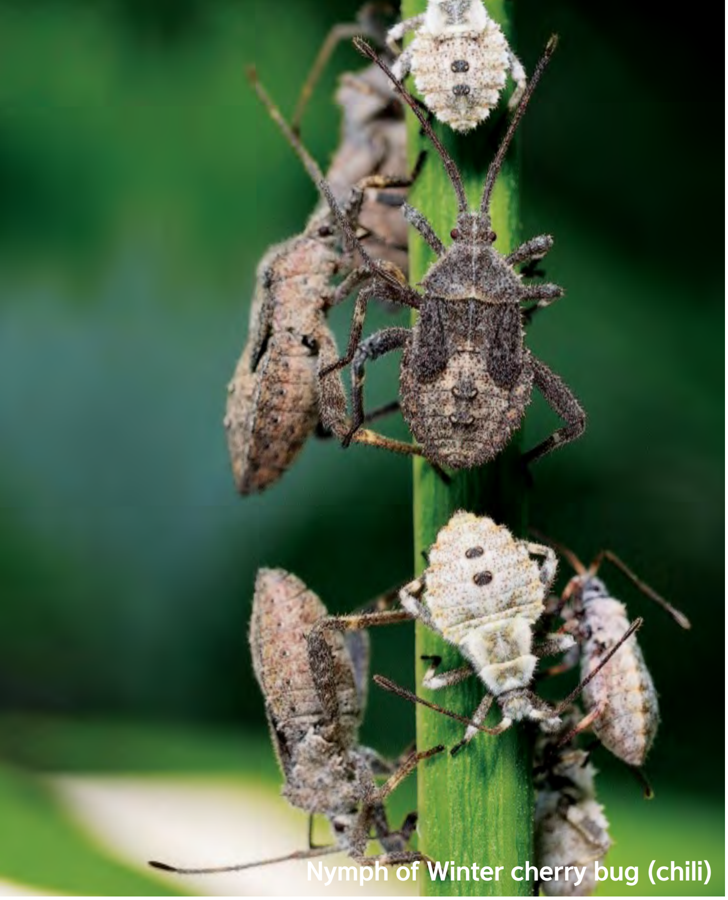
Refer to pages 25, 35~37

JADAM Natural Control Ratio

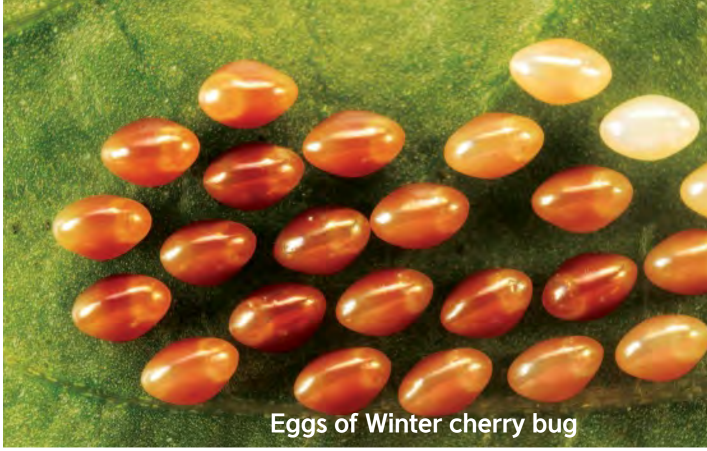
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		400ml	500ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

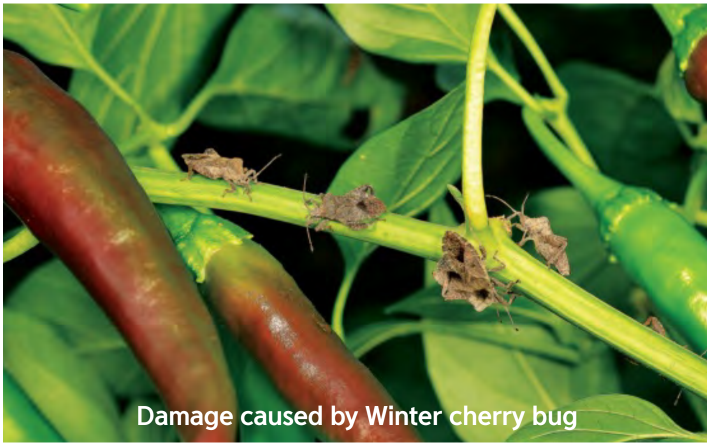
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



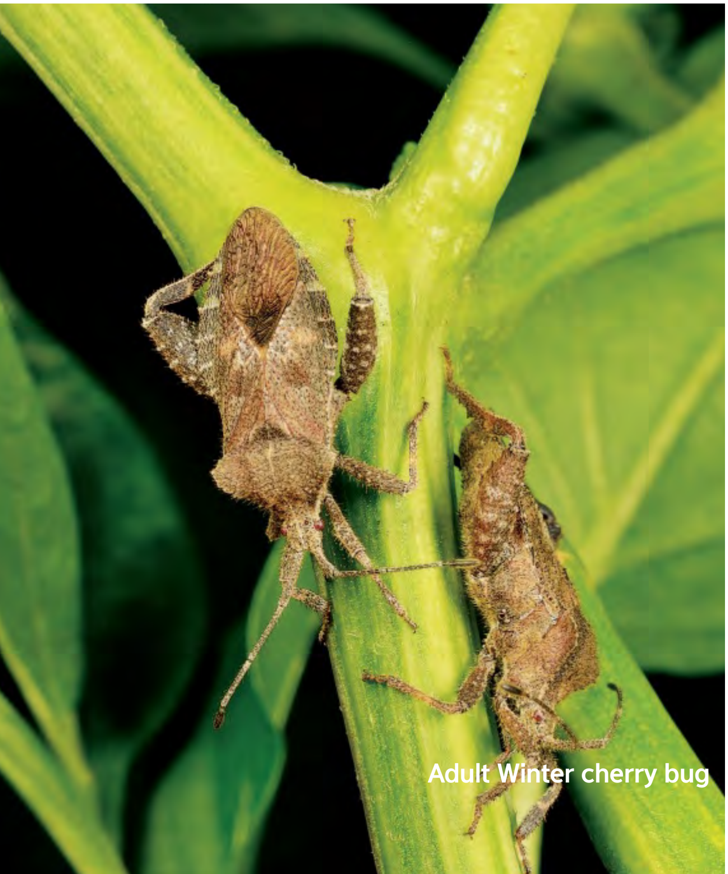
Nymph of Winter cherry bug (chili)



Eggs of Winter cherry bug



Damage caused by Winter cherry bug



Adult Winter cherry bug

Rice black bug

Scotinophara lurida

Description

The body length of adult insects is about 8-10mm, and the whole body may be black or slightly dark brown. The surface is rough and matte. The head of the adult insect protrudes forward, the antennae are long 5 segments, and the fifth segment is the most prolonged and extensive. Thorn-shaped projections are extended to the sides at both ends of the front edge of the dorsal plate. Eggs are grayish-white spheres with a size of 0.9mm, and nymphs are reddish-brown or grayish brown.

Life cycle

They occur one generation per year and overwinter as an adult insect under the fallen leaves or in dead weeds; it moves to the main paddy field at the beginning of June. The peak outbreak of adult insects of the overwintered generation occurs in rice fields in early July, and the nymphs occur from late July to late September. New adult insects occur from the end of August till the harvest season.

The average number of spawning of adult insects is 30.7, and the maximum spawning is 55. Adult spawn eggs 12-16 at a time, the average egg period is 4.3 days, and the nymph period is 45.8 days. Rice black bug is attracted in the early stage. Their occurrence is detectable by installing a light trap. They often appear near the rice field.

Damage

Both adults and nymphs damage the stems of rice and suck the sap. The suction part is faded, and the leaf grown in the suction part dries from the damaged part to the upper part, and if the damage is severe, the new leaves dry and die before unfolding. There are many damage symptoms at the edge of rice fields, but if it is severely damaged in the early stages of growth, the plant's length is shortened, and rice may not bloom. If damage is received before or after the ear emergence the ear will stand upright and die.

(National Crop Pest Management System/NCPMS)

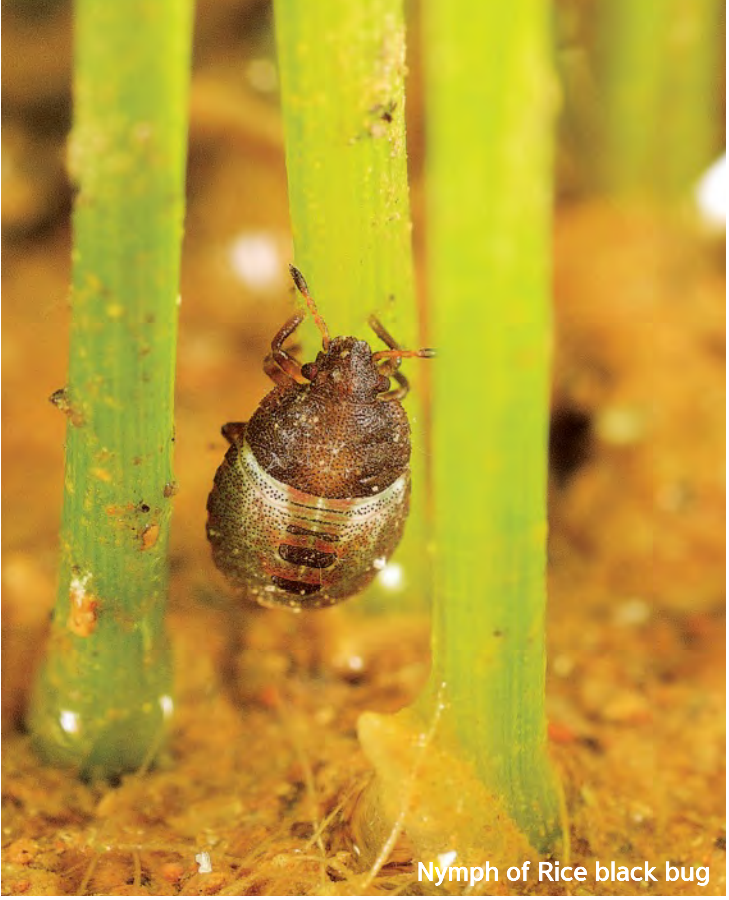
JADAM Natural Control Ratio

Refer to pages 25, 35~37

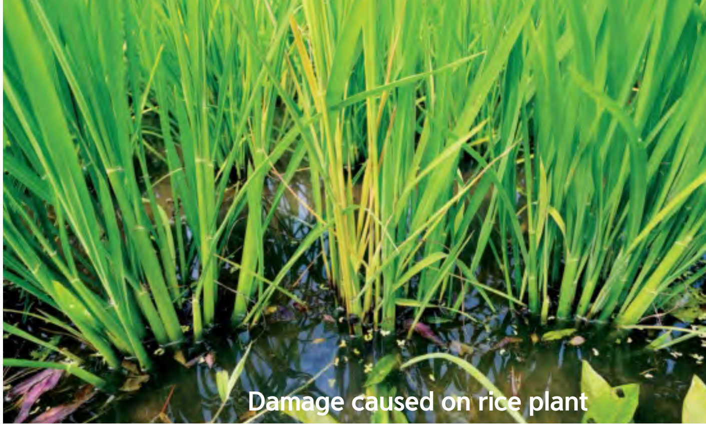
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil		60g	80g
Control interval	10days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

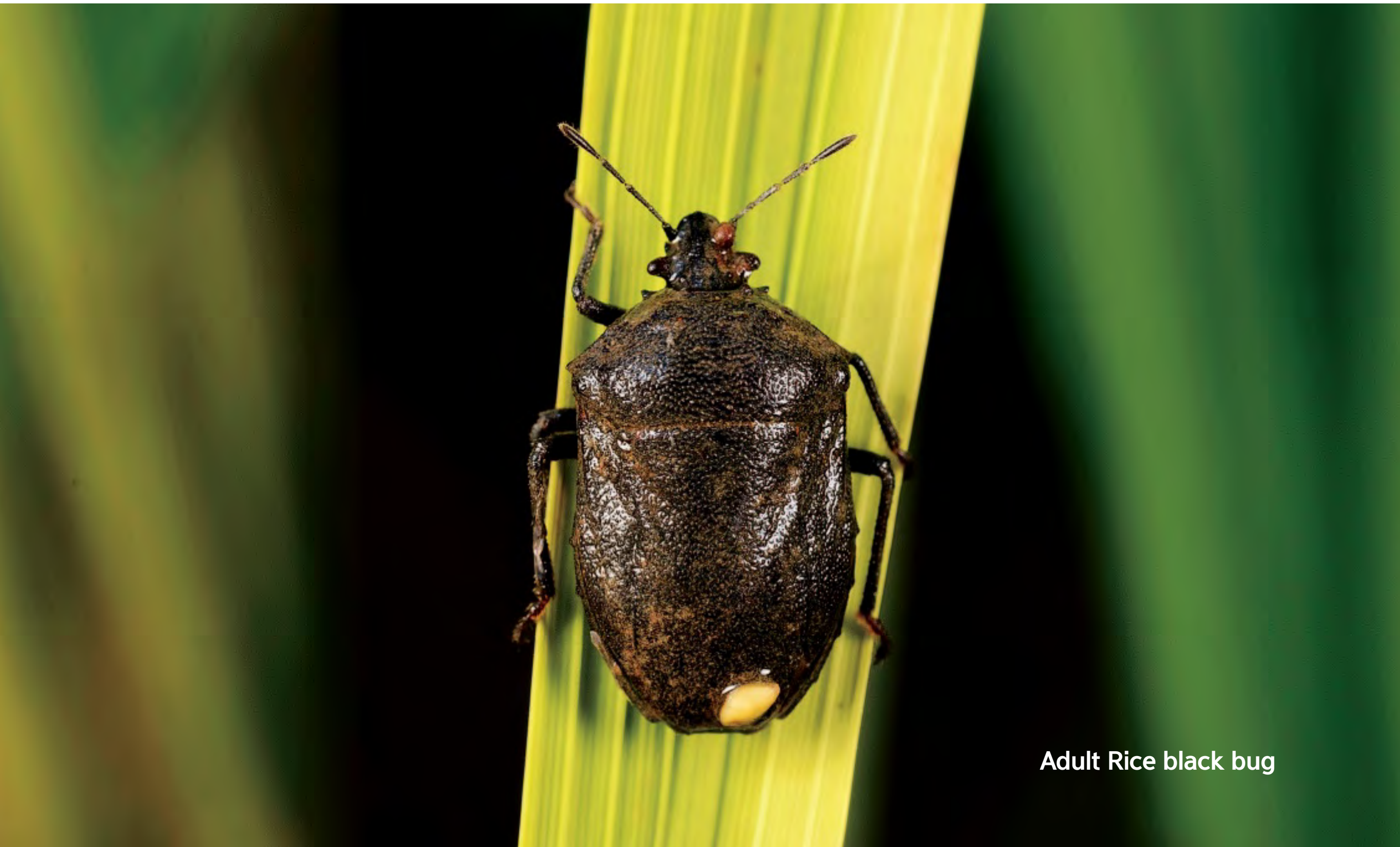
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Nymph of Rice black bug



Damage caused on rice plant



Adult Rice black bug

Adelphocoris suturalis

Description

The body length is 7.5~9mm. The body is light yellow-green with dark brown patterns and is covered with fine hairs. There are many variations in color, and continuous variations can be seen. Compound eyes are large and black, and there are no longitudinal grooves on the crown. Antennae are divided into 3 segments, and 2 distal segments are dark and long, the second segment is longest, and the third segment is the next longest. There are many needle-shaped thorns on the calf joint. The color varies greatly, and it is considered a different species when comparing the individuals with the patterns at both extremes.

However, many individuals can be seen with continuous variables. The individual pattern with two microscopic black patterns in the center of the pronotum, the pattern gradually expands, and two more patterns appear on the front edge of the front thorax. The transition path of an individual can be identified with four patterns.

Life cycle

It is believed to cause the formation of spots and malformations of new shoots and fruit of the crops such as mugwort, garland chrysanthemum, barley, rice, sesame, soybeans, sunflowers. These are major symptoms of damage from other Adelphocoris suturalis, so it is an area that should be studied in the future. (Korea National Arboretum)

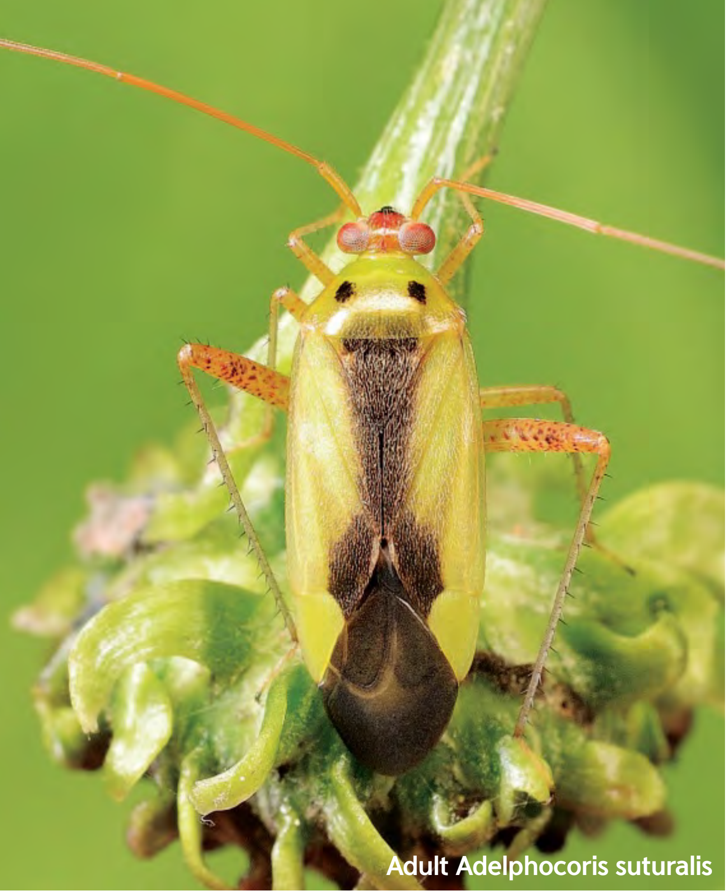
Refer to pages 25, 35~37

JADAM Natural Control Ratio

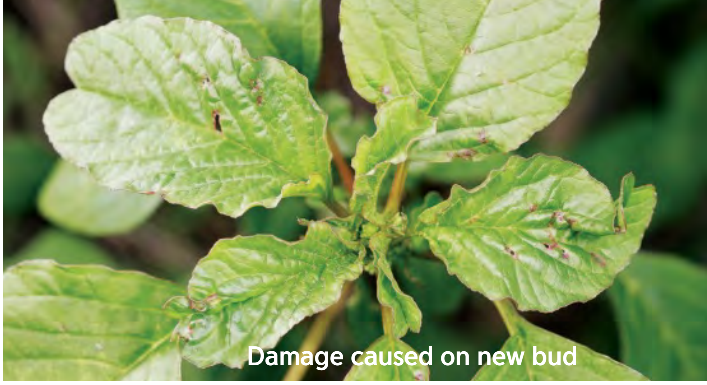
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

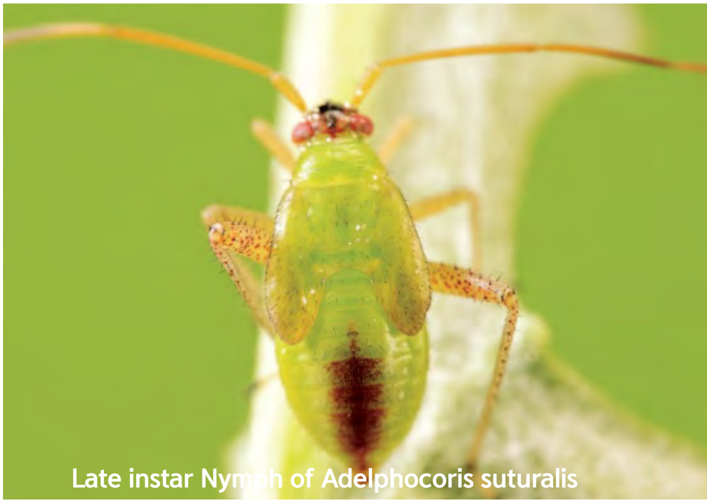
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



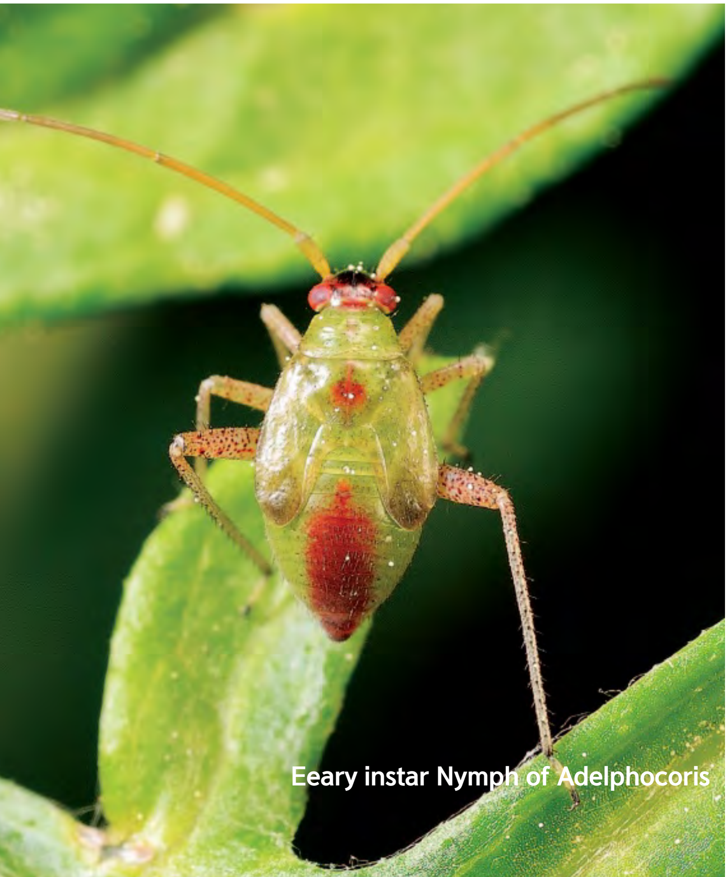
Adult Adelphocoris suturalis



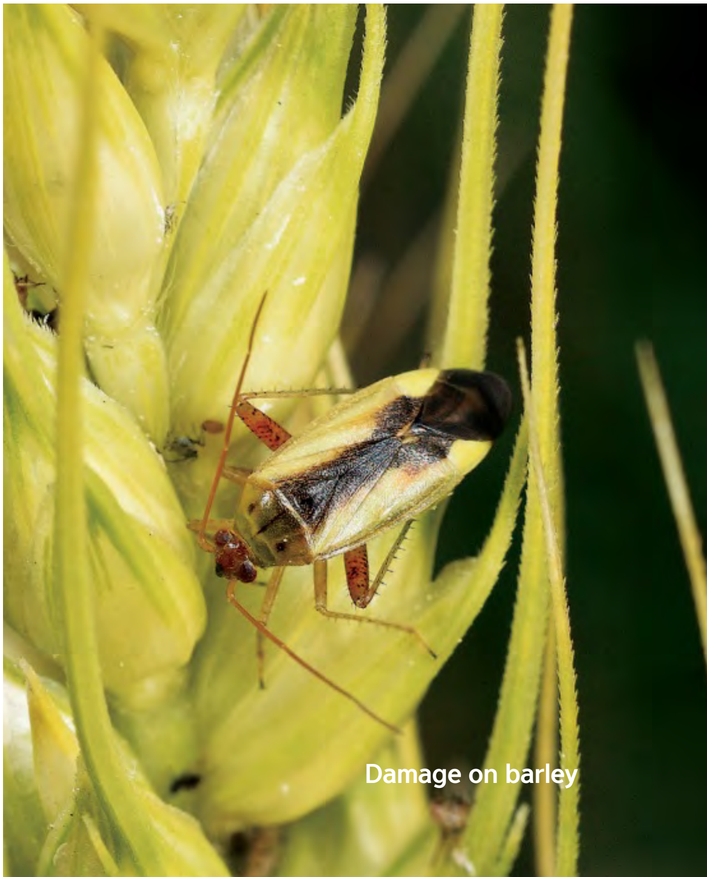
Damage caused on new bud



Late instar Nymph of Adelphocoris suturalis



Eeary instar Nymph of Adelphocoris



Damage on barley

Yellow brown stinkbug

Halyomorpha halys

Description

The body length is 14~18mm. The body has an irregular yellowish-brown or reddish-brown pattern. The lower side has a dark brown pattern on a yellowish-brown or grayish-yellow background. Antennae are a yellowish-brown color on both ends of the fourth segment, and the fifth segment's color tone is brighter than other segments. Pronotum rounded and protrude broadly.

There are 4 yellowish-brown spots on the front part horizontally and yellowish-brown patterns on both ends of the base of the small shield plate. The abdomen's rim broadly extends to the outside of the fore wing and appears alternately with black and tan patterns on each segment. The nymph's body length is dark brown, about 14mm, and it is round and flat. Adult insects move to a place to winter in October to November and winter on the bark of old trees. (Doosan Encyclopedia)

Life cycle

The hatched larvae live in a group, and when they become adults, they hide in the shade at midday and mainly attack in the early morning or evening-the damage rate decreases during the fruiting season. The damage intensifies from September to October. They spawn about 20 to 30 eggs on citrus leaves.

Damage

The damage starts at the end and beginning of September when the coloring of fruits begin. Infestations are more severe in an orchard with many weeds due to the lack of weeding.

There is no specific sign in the early stage of damage when looking at the initial appearance. The fruit is punctured with a globular needle. However, after a few days, it turns yellow from the root neck, falls, and the coloring becomes terrible.

(National Crop Pest Management System/NCPMS)

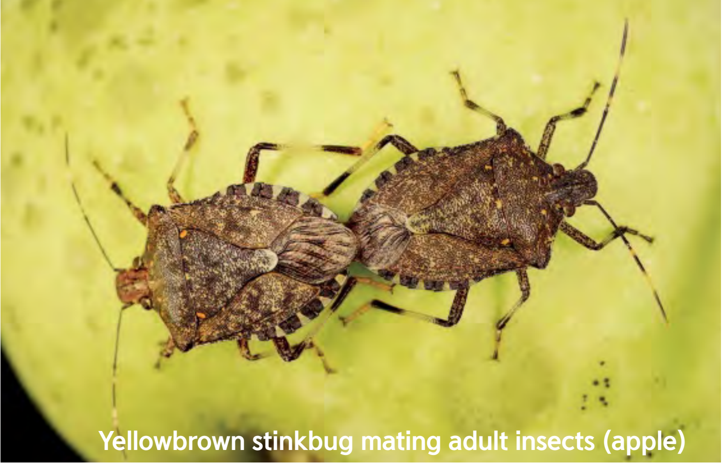
Refer to pages 25, 35~37

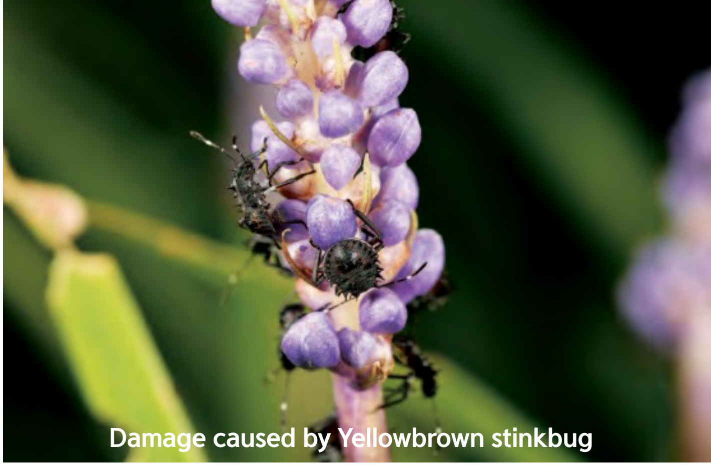
JADAM Natural Control Ratio

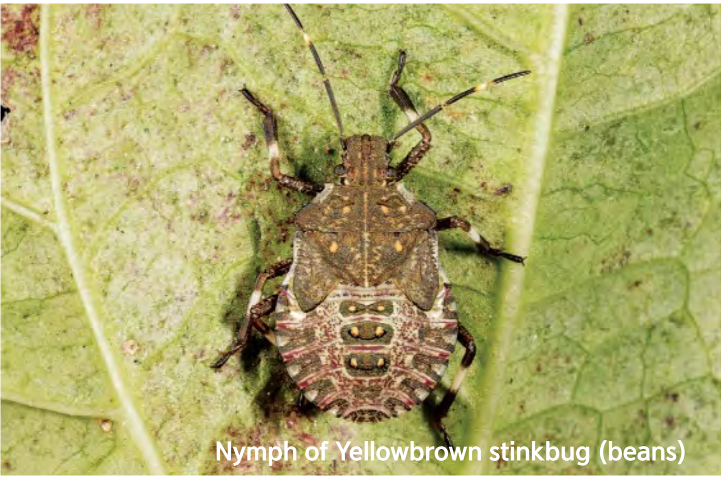
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		500ml	600ml
JMS			
NaOH			60g
Fine soil			60g
Control interval	10days	Visible effect	10 minutes

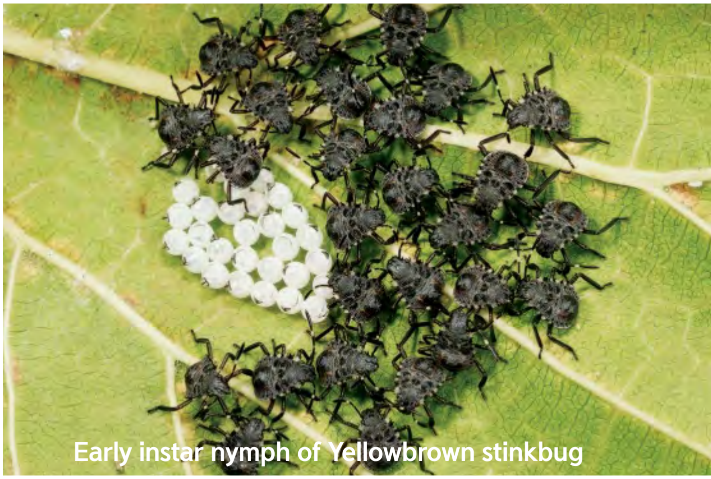
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

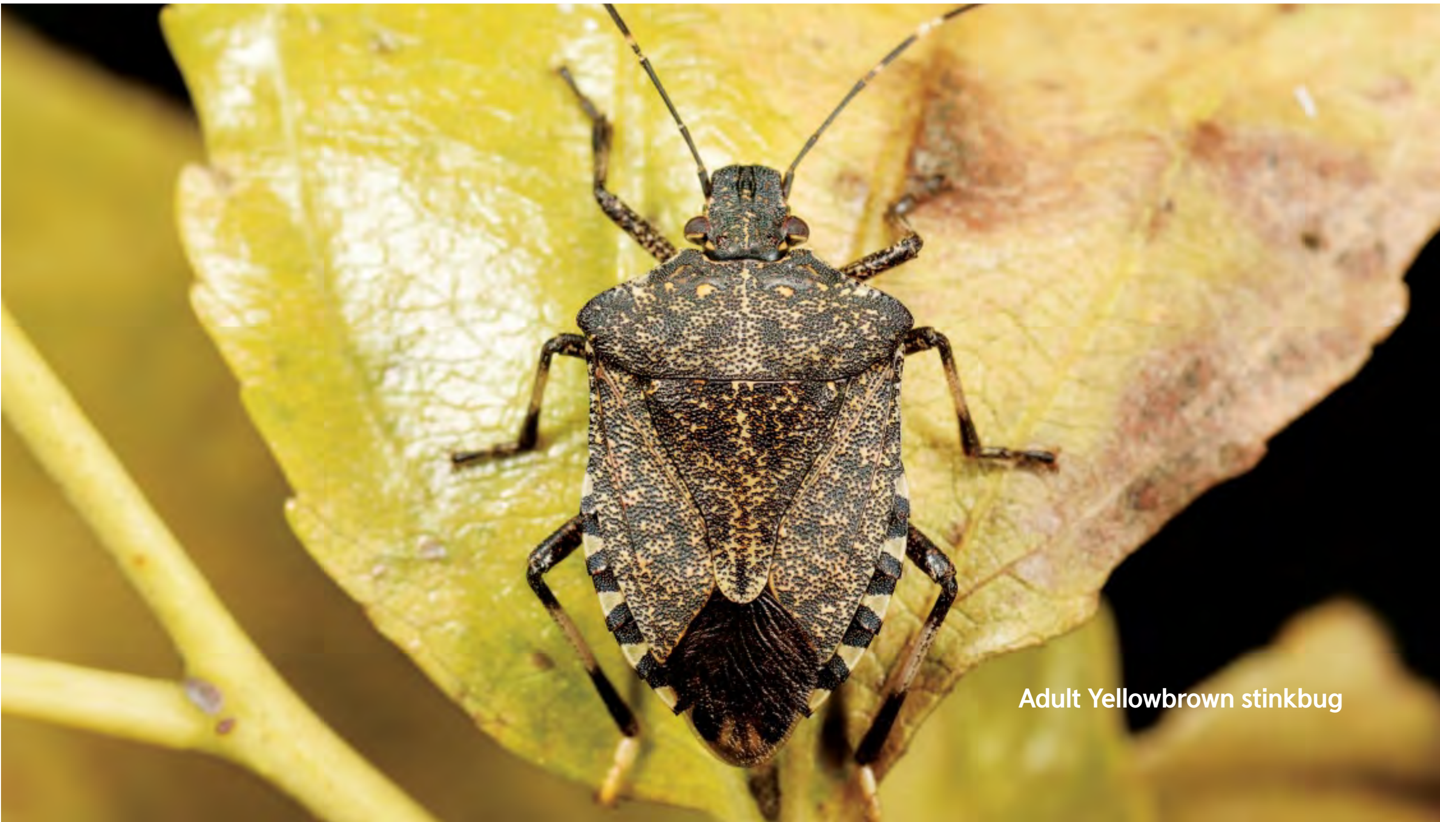
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Yellowbrown stinkbug mating adult insects (apple)


Damage caused by Yellowbrown stinkbug


Nymph of Yellowbrown stinkbug (beans)


Early instar nymph of Yellowbrown stinkbug


Adult Yellowbrown stinkbug

Anoplocnemis dallasi

Description

The body length is 18.5~24mm. The color of the body is dark brown, and depending on the individual, the color of the body is light or brown, but the vaginal part is all dark brown. Sometimes it looks grayish-brown because it has dense yellowish-white tiny hairs on a black background.

The lower side of the body is dark brown. The snout is short with 4 segments and stops at the anterior end of the lower segment of the middle leg. The head is small, and the left and right antenna (tactile sensor) contact each other at the front of the head.

The pronotum has a horizontal protruding part near the anterior and posterior margins of the pronotum and the posterior lateral margin slightly protruding. The small shield plate is small and triangular, and the anterior edge is sharp. The small wing is far beyond the abdomen's tip and is narrow since the membranous part is long. There are many wing veins, but they are almost parallel. The thigh joint of a hind limb is triangular in males, thick curved in females, and has 1 thorn inside the tip.

Damage

It sucks out the sprouts and pods of legumes such as beans and sorghum. Adult insects appear from August to September. (Doosan Encyclopedia)

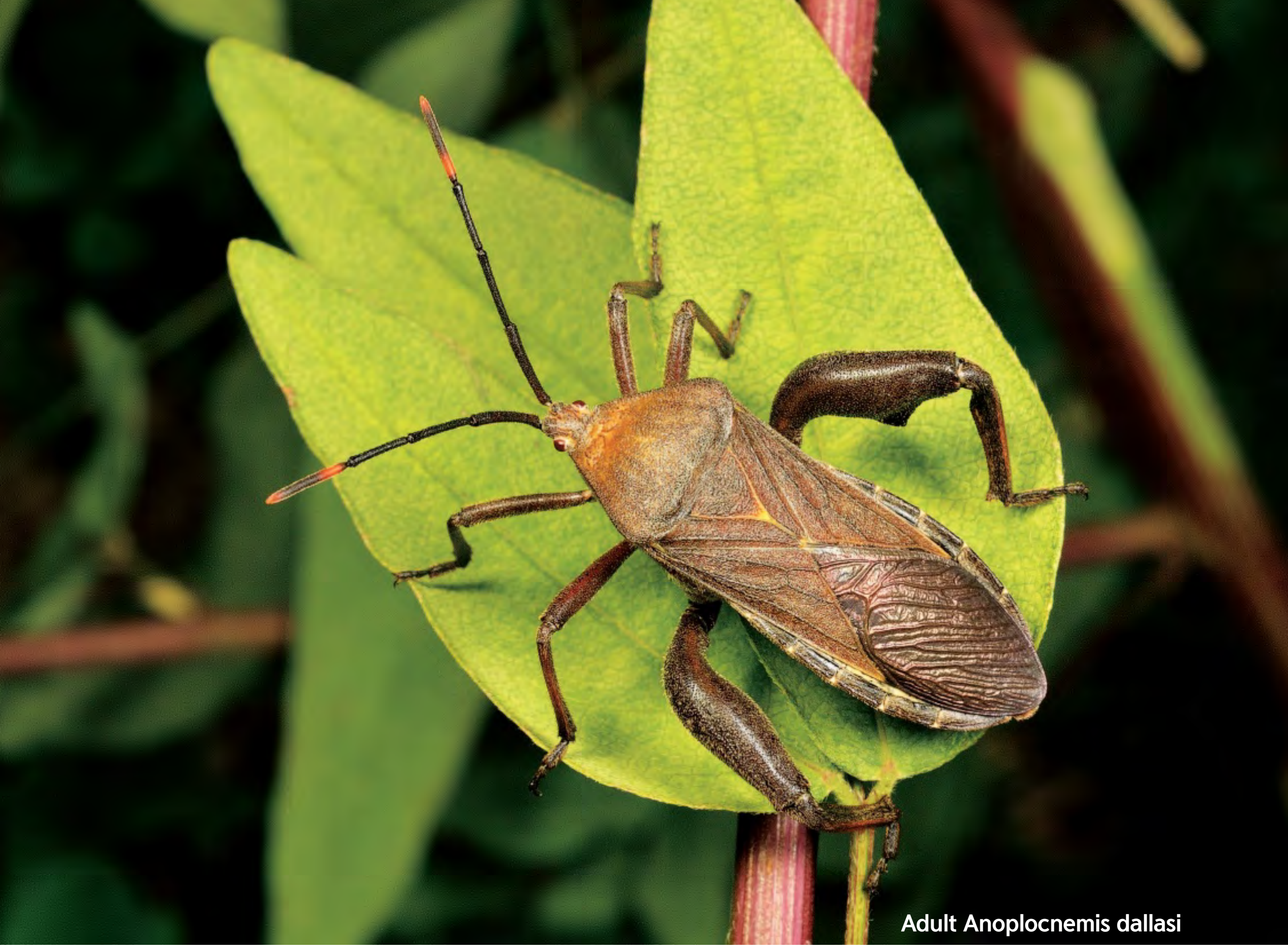
Refer to pages 25, 35~37

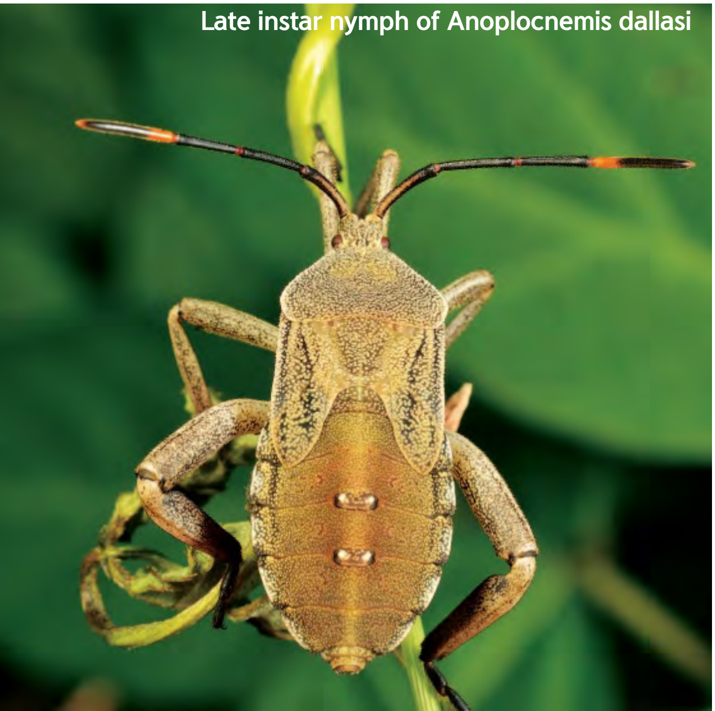
JADAM Natural Control Ratio

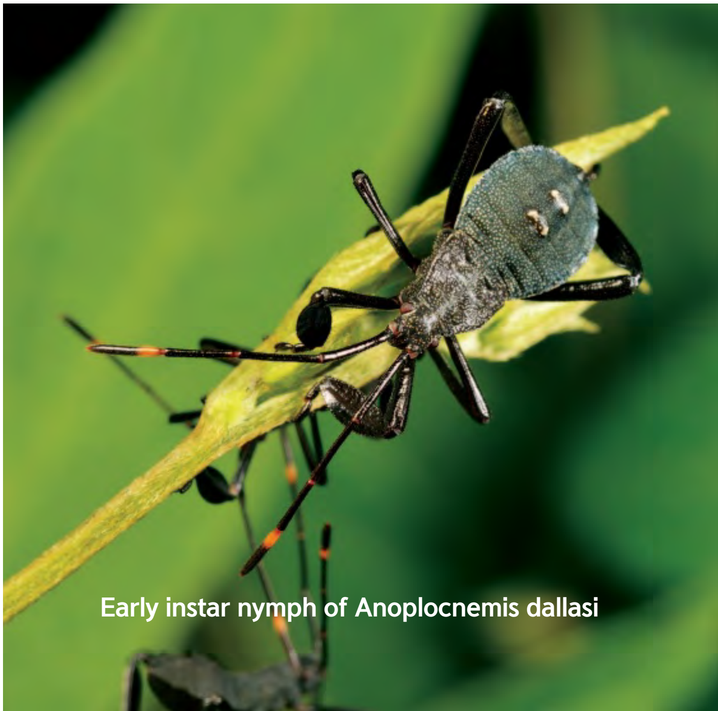
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		500ml	600ml
JMS			
NaOH			60g
Fine soil			60g
Control interval	10days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Anoplocnemis dallasi


Late instar nymph of Anoplocnemis dallasi


Early instar nymph of Anoplocnemis dallasi

Bean bug

Riptortus clavatus

Description

The body length of an adult insect is 1.5cm, the waist is narrow, and the third leg has serrated thorns. Adults are 14~17mm, and the width is relatively large, 2.5~3mm. Males have black lines on the head and thorax, and yellow discontinuous patterns are distinct, but females are unclear. Nymphs are similar in form and behavior to ants.

Life cycle

There was no significant damage in the past, but as chemical pesticides have become more common in recent years, natural predators have disappeared. They occur 2-3 times a year, and after wintering as an adult insect from the remnants of the pavement or weeds around the pavement, it moves to the host crop next spring and causes damage. First-generation adult insects occur from late June to late July, and second-generation adult insects occur from early August to mid-September.

Damage

The adult and nymph damages by sucking the sap (fluid) of legume plant. Causing deformation of the bean's tip and wrinkles the surface, which turns white, then eventually causing beans to fall. In addition, it damages the seeds and fruits of rice plants. (National Crop Pest Management System/NCPMS)

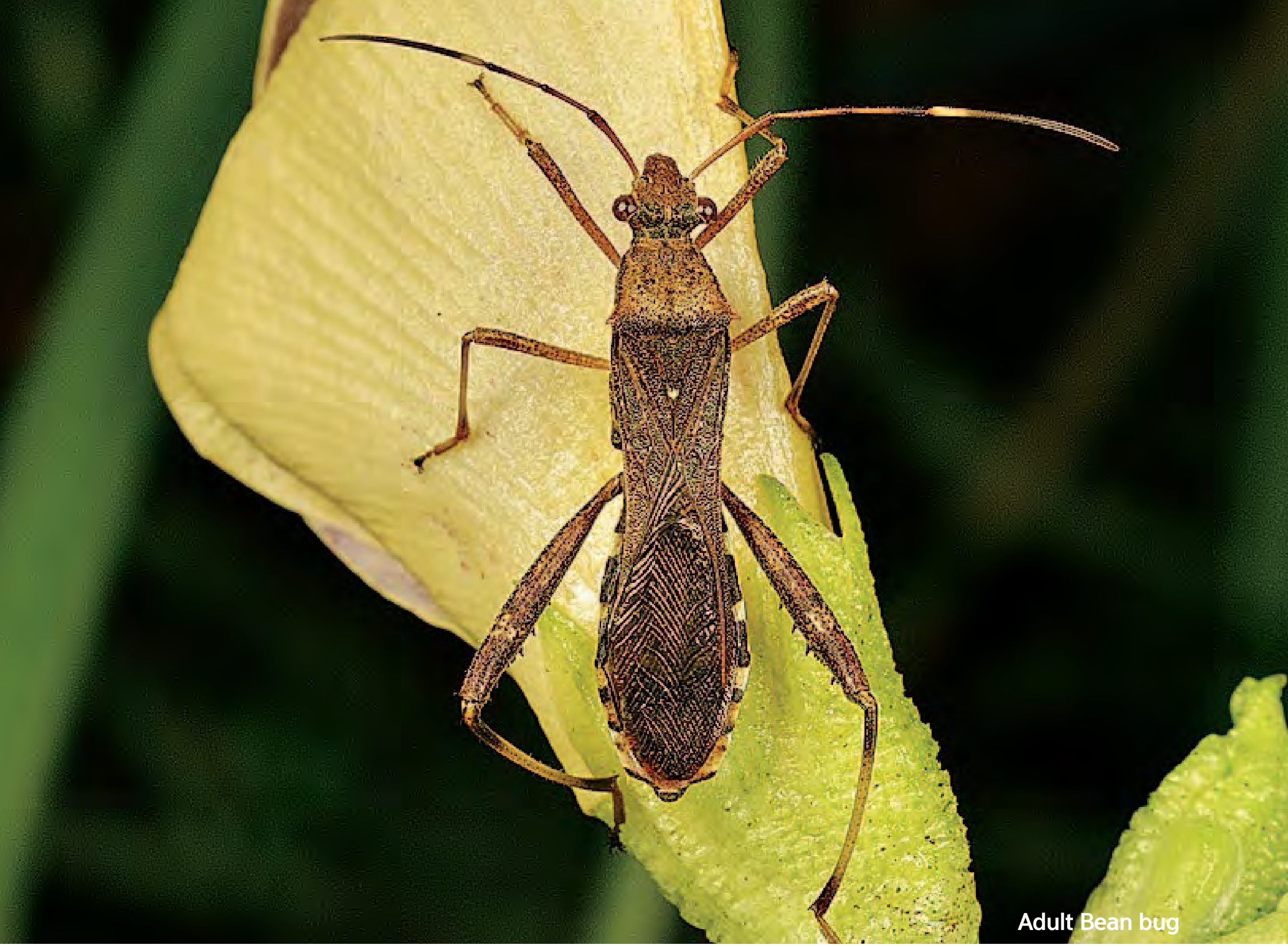
JADAM Natural Control Ratio

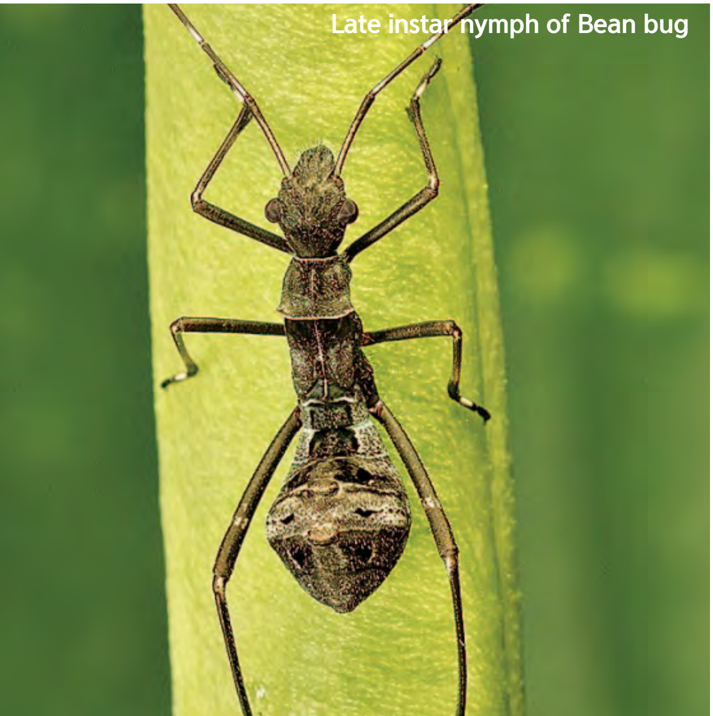
Refer to pages 25, 35~37

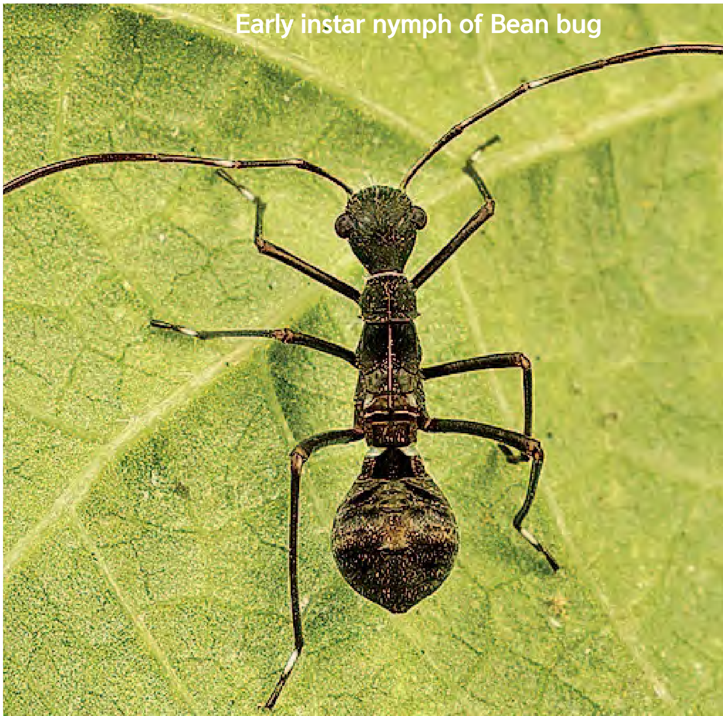
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS		500ml	600ml
JMS			
NaOH			60g
Fine soil			60g
Control interval	10days	Visible effect	1~2day

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Bean bug


Late instar nymph of Bean bug


Early instar nymph of Bean bug

Moth

Moths are widely distributed worldwide and consist of about 180,000 species and are divided into about 80 families. The size of moths varies greatly depending on the type. The small ones have a wing length of about 4mm, the large ones as long as 140mm, and there are many types that have 40-50mm wings.

The structure of the body is basically like a butterfly. In general, there are two pairs of membranous wings, part of the body and appendages are covered with scaly powder, the large jaw is almost degenerated or lost, and the mouth frame is formed in a long suction pipe (proboscis) because the small jaw is joined on both sides.

The antennae have a thread or whip shape, tapering at the end, or pruned in the shape of feathers and combs, so it is different from a butterfly with a swollen tip. In addition, the body is thick, the wings are smaller than the body, and there are wing thorns connected to the front wing and the rear wing, with exceptions to all.

In terms of ecology, moths usually have their wings attached to or overlapped in a roof shape on top of the body when stationary or are at right angles to the body's axis. However, the wings sit vertically toward the butterfly's back, and sometimes sit horizontally. Among the moths, some of the horned moths and moths fly during the day sit with their wings erected.

Most moths are nocturnal and often gather around lanterns. This general difference between butterflies and moths is not so important systematically. Since there are exceptions, this distinction can be a convenient method because it is considered secondary arising from ecological differences. (Doosan Encyclopedia)

Persimmon fruit moth

Stathmopoda masinissa

Description

The body length of an adult insect is 6-7mm, and the length of a wing is 14-19mm. The head is brown, the thorax is dark brown, and the abdomen is dark grayish white. There is a yellowish-brown oval pattern on the back. There is a yellowish-brown pattern near the end of the fore wing. The larvae are about 10mm long, the head is brown, and the body is dark purple, and each body has many wrinkles, small black projections are scattered, and has white hairs.

Life cycle

They occur twice a year, making cocoons between stems or branches or under rough bark and wintering as a larva in them. It becomes a pupa in early May, and adults appear from the end of May. Adult insects attach to the backside of leaves during the day, and become active at night and lay eggs on the leaves, branches, and stems of fruits.

After 10-15 days, the egg hatches and damages the young leaves then grows up and digs into the fruit to feed. In spring, inspect carefully to check between the stem cells' cuticles to see if the larva's excretion is identifiable. Damaged fruits can be easily identified because of excretion on the fruit.

The first generation of larvae lasts 30 days and becomes a pupa, then becomes an adult again within 10 days and lays eggs. Spawned eggs hatch in 4-5 days, shorter than the first generation, and become larvae. The larvae of the 2nd season damage 3~4 fruits and mature to prepare for wintering.

Damage

The hatched larva feeds on the fruit through the fruit stalk, and an excretion is discharged between the fruit stalk and the fruit. Young fruits turn brown and fall, and fruits damaged by the second generation larva turn red faster than undamaged fruits.
(National Crop Pest Management System/NCPMS)

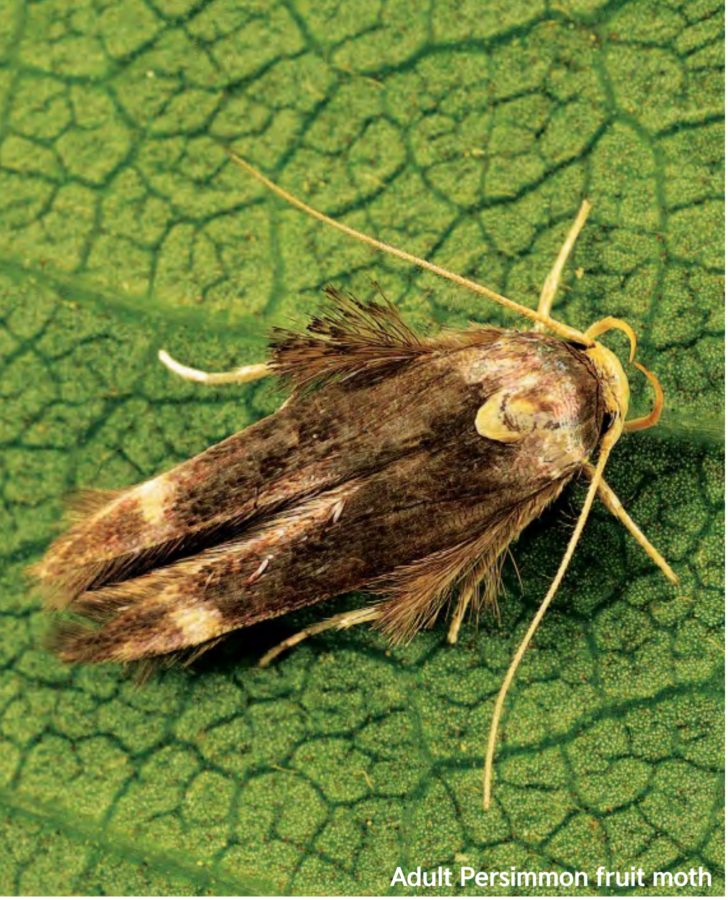
JADAM Natural Control Ratio

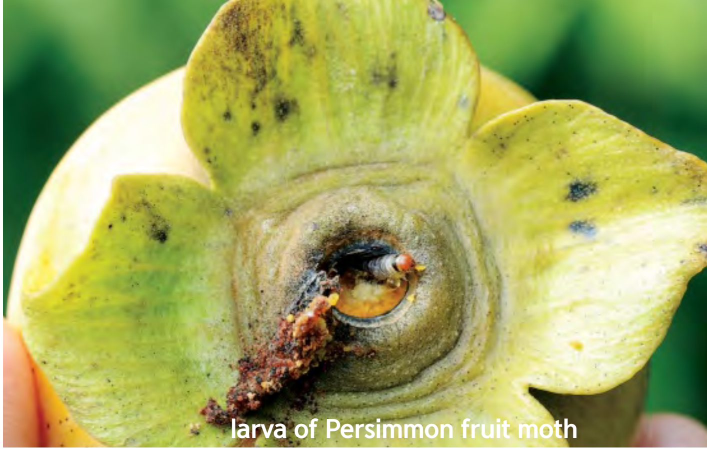
Refer to pages 25, 35~37

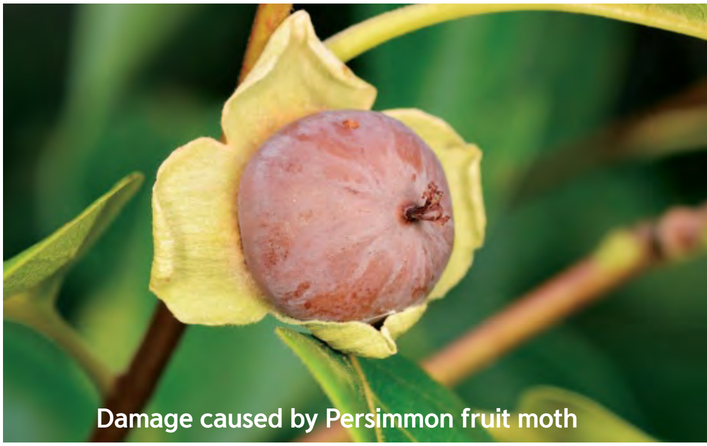
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil	80g		40g
Control interval	10days	Visible effect	30minutes

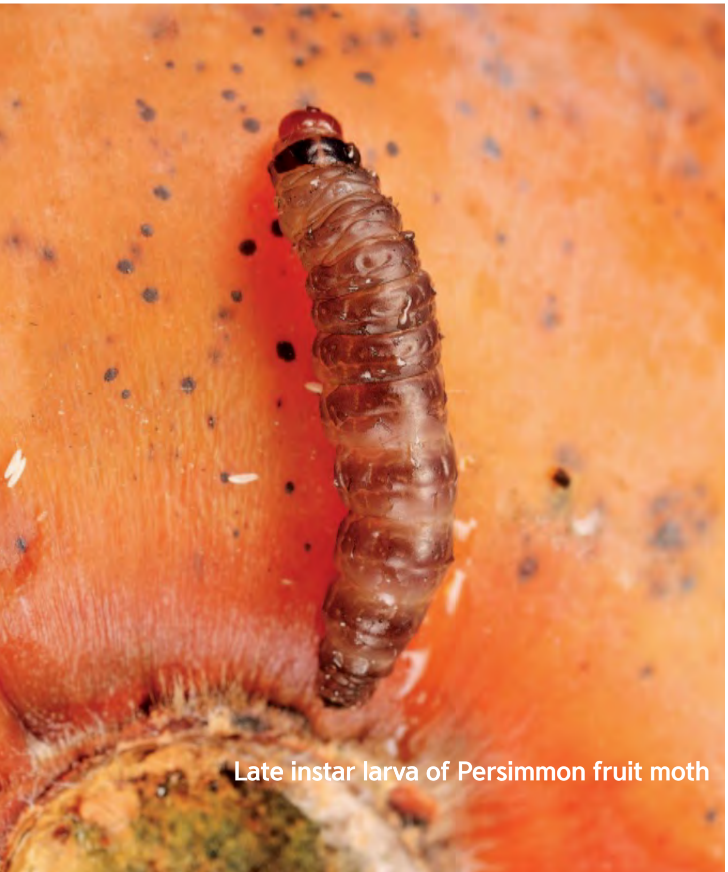
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Intensive control is carried out when pests occur.

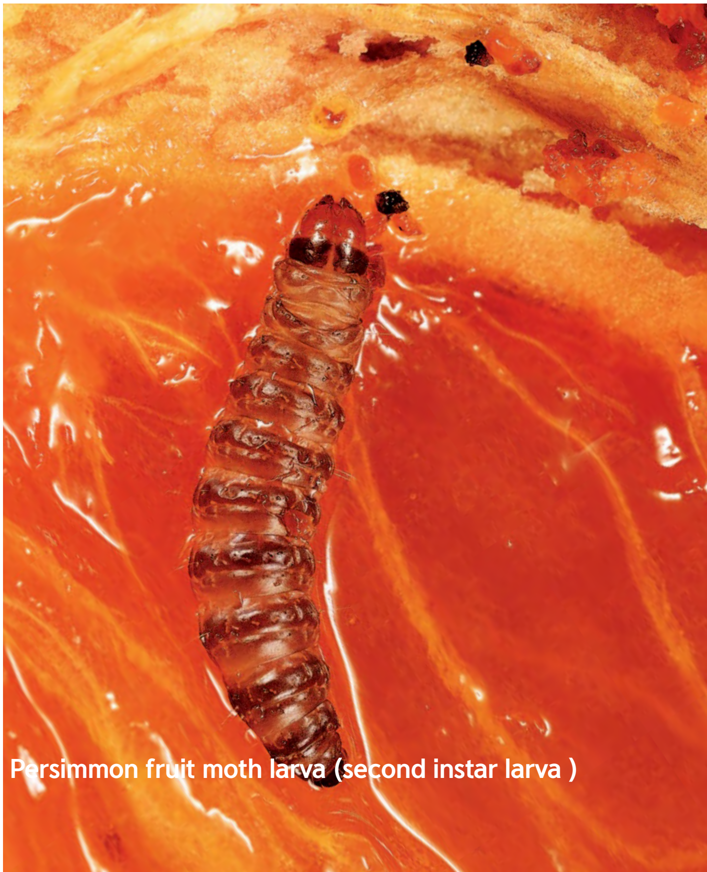
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Persimmon fruit moth


larva of Persimmon fruit moth


Damage caused by Persimmon fruit moth


Late instar larva of Persimmon fruit moth


Persimmon fruit moth larva (second instar larva)

Twirler moth

Gelechiidae

Description

Adults are yellowish-brown, but there are two dark bands in the middle of the wing. The larva is dark brown with a black head and a little purple on the thorax and dark brown stripes on the back.

Life cycle

There are few studies on this pest, but it is estimated to have 4-5 generations a year.

Damage

Caterpillars and damage appear from early May, mainly affecting shoots and young leaves. The young larvae burrow in the leaves and eat the leaf, the damaged leaf appears to be rolled with thread which is similar to symptoms affected by leaf roller moth (Tortricidae) the damaged part of the leaf shows a white film on veins.

(National Crop Pest Management System/NCPMS)

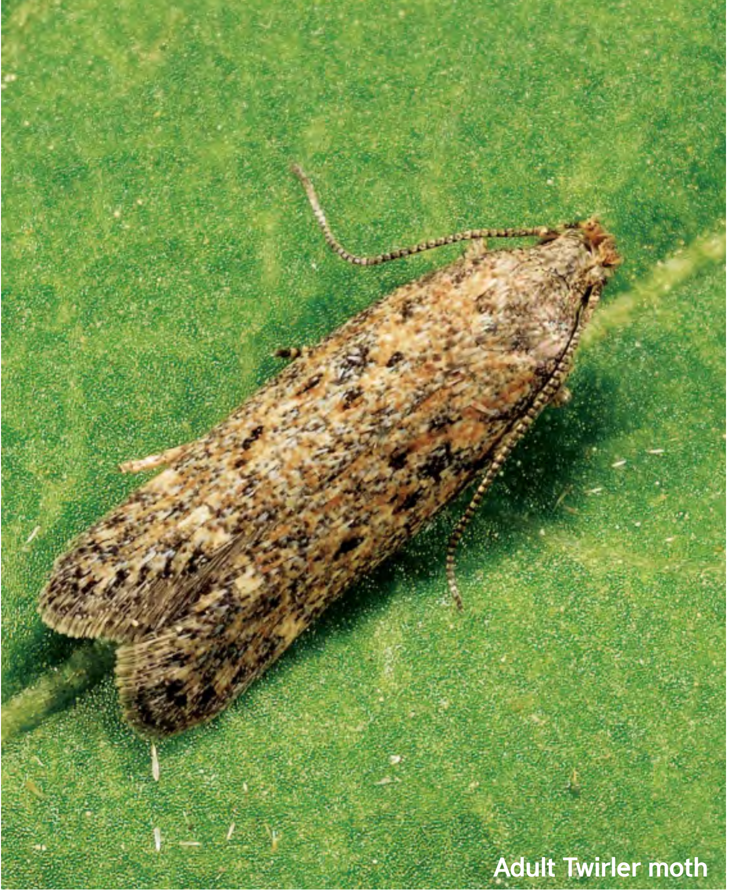
Refer to pages 25, 35~37

JADAM Natural Control Ratio

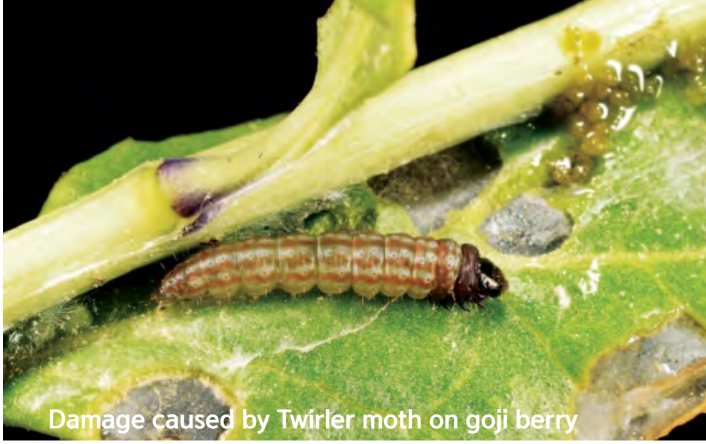
Standard (20L)	Prevention	Occurrence Time	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.

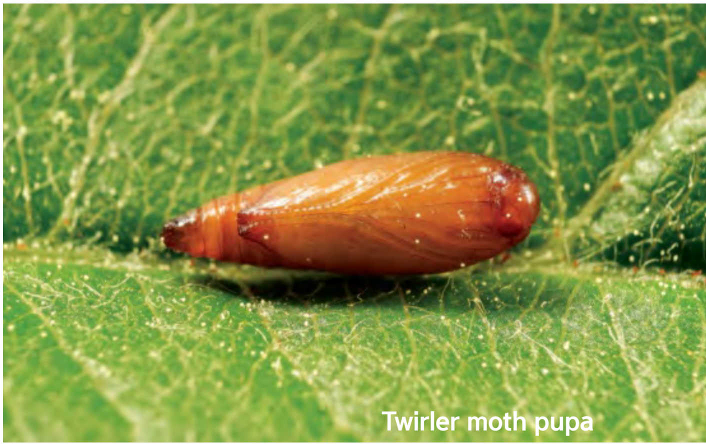
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



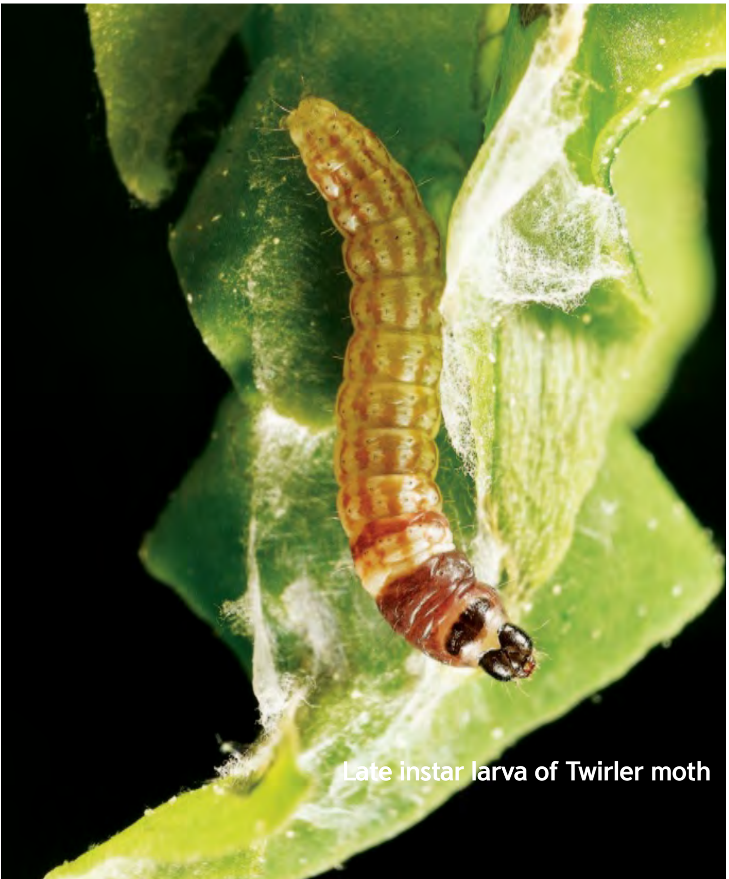
Adult Twirler moth



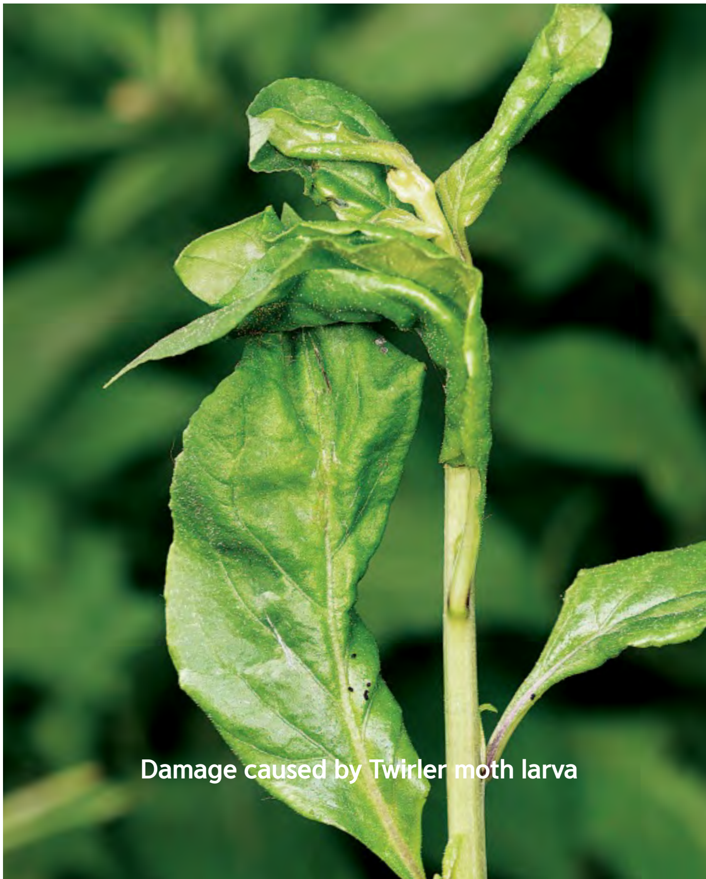
Damage caused by Twirler moth on goji berry



Twirler moth pupa



Late instar larva of Twirler moth



Damage caused by Twirler moth larva

Citrus leafminer

Phyllocnistis citrella

Description

Adult insects are about 4㎜ in size and are small pests with a silver-gray color. The eggs are about 0.3mm, almost invisible to the eye, and the larvae are light yellow and about 0.3mm long.

Life cycle

It takes about 2 weeks for the eggs to hatch and become adults in summer and autumn. Most adults cannot live more than one week, but they can live up to 160 days in some cases.

Although wintering insects begin their activities around April, the density is not high in spring, so the early spring damage is minimal. They occur a lot in the summer and autumn after the end of July, causing damage. When They occur, damage is observable on the leaf with the naked eye.

Damage

The damage in spring, but mainly in summer and autumn, and they scatter along leaf veins, and hatching larvae cause damage by eating the epidermis of the leaf. The tunnels eaten by the larvae form a thin curve, and the damaged leaves atrophy, deform, and development significantly deteriorates. Ulcer disease bacteria invade through the wound on the damaged area, making conditions prone to ulcer disease.

(National Crop Pest Management System/NCPMS)

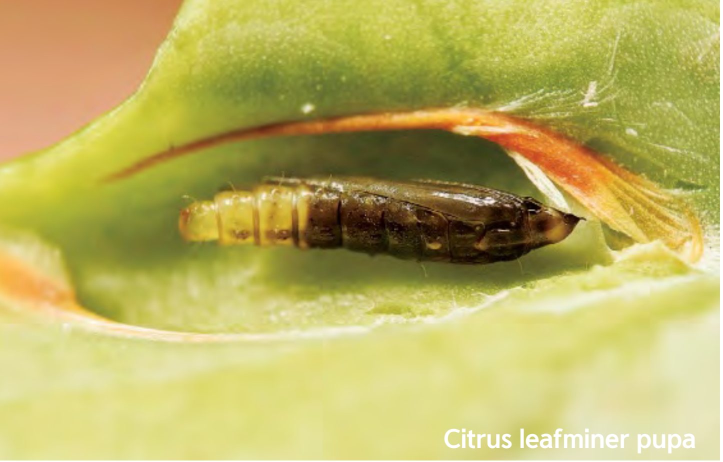
JADAM Natural Control Ratio

Refer to pages 25, 35~37

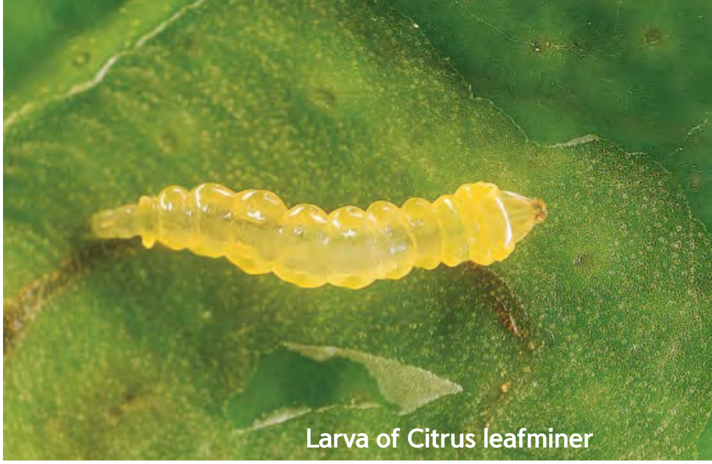
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	80ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH	40g		40g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.

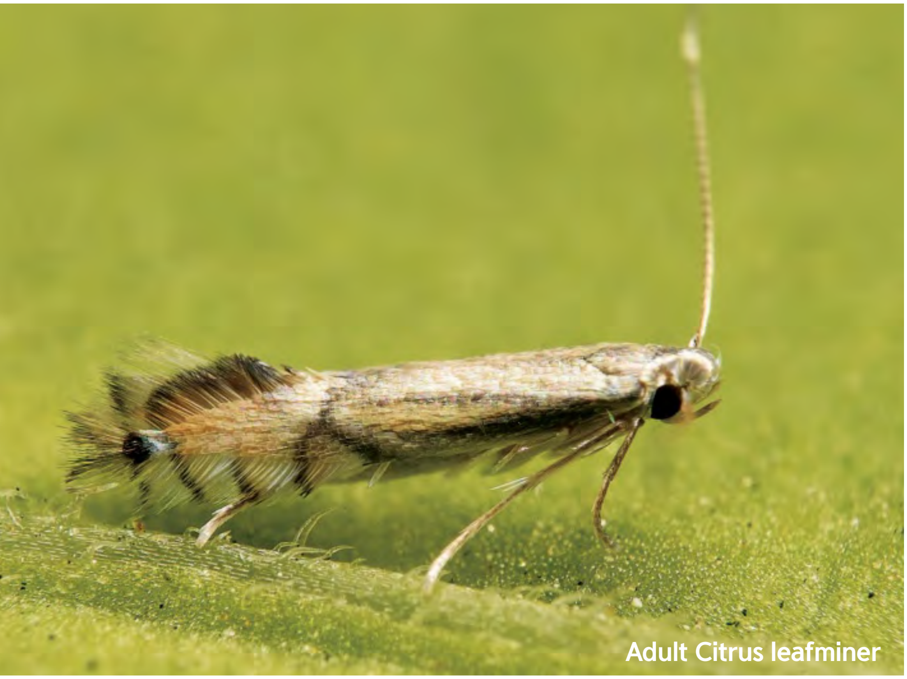
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



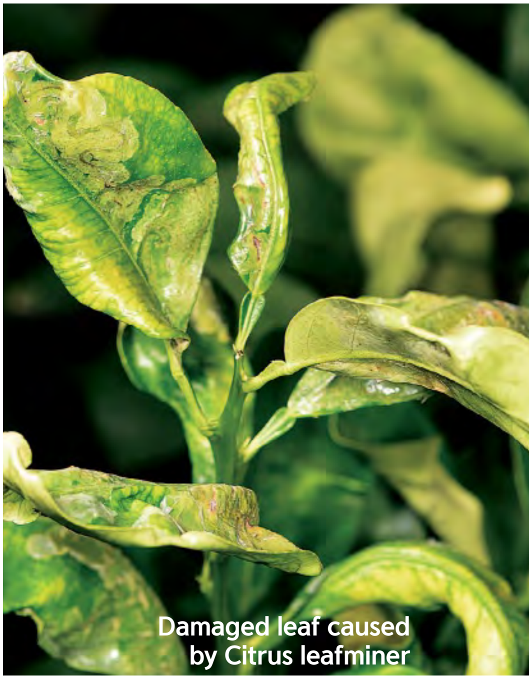
Citrus leafminer pupa



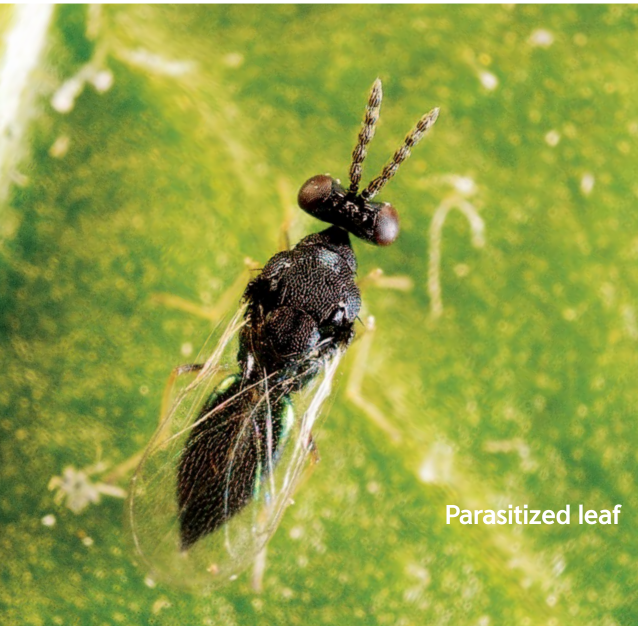
Larva of Citrus leafminer



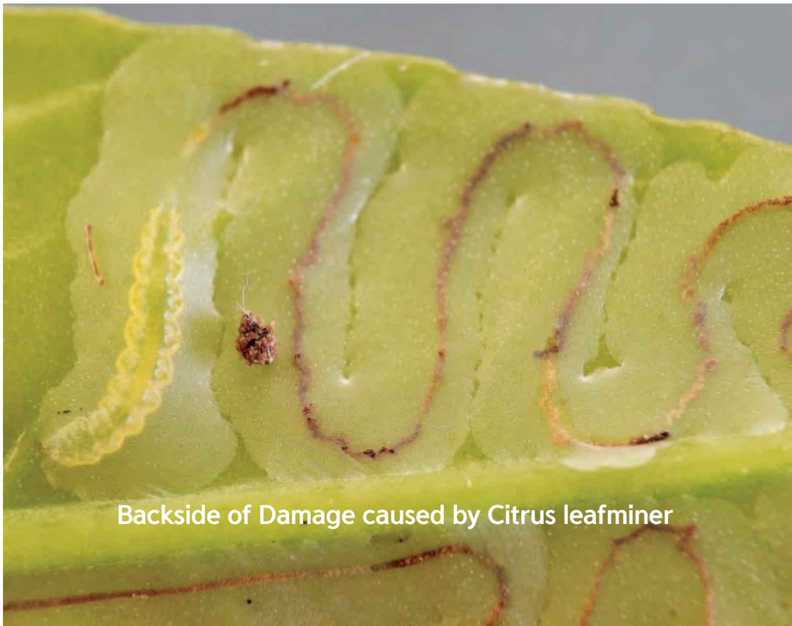
Adult Citrus leafminer



Damaged leaf caused by Citrus leafminer



Parasitized leaf



Backside of Damage caused by Citrus leafminer

Monema

Monema flavescens

Description

The antennae of adult insects are thread-shaped, slightly flat, and yellowish-brown in color. The wing is yellow, the outer part of the fore wing is reddish-brown, and there are two black-brown diagonal lines on the edge. The length of the wing is around 32~34mm.

The larva's body length is about 24 mm, the head is brown, and there are dark purple patterns on the front and back of the body. The center and sides are green. The body's central and side parts are green, and there are poisonous thorn hairs on the surface of the body. Their cocoon is egg-shaped and has dark brown vertical stripes on a grayish-white background.

The lower lip mustache has a yellowish-brown color and extends long and passes the crown. The face is brown, and the crown is yellow. The legs are brown, and there are 2 pairs of claws on the hind legs' calf joints. The fore wing has a dark brown color with the middle and outer transverse lines obliquely inclined at the end of the wing on a pale yellow background. The hind wing is lighter than the fore wing, and the outer edge is dark-colored.

Life cycle

They occur once a year. Wintering larvae become pupa in May and then fable in June. After mating at night, adult insects spawn 1-2 on a leaf, and June to July, and they make cocoons on one back branch and winter in them. Adults are active only at night.

Damage

The young larvae eat only from the behind of a leaf, but only the leaf's main veins are left behind after growing. It winters as a larva in an oval-shaped cocoon. It is also a pest of fruit trees such as persimmon trees. Young larvae hatched from eggs live on the backside of a leaf as a group and then disperse after eating. When larvae and adult larvae touch the human body, they cause inflammation due to poison. (National Crop Pest Management System/NCPMS)

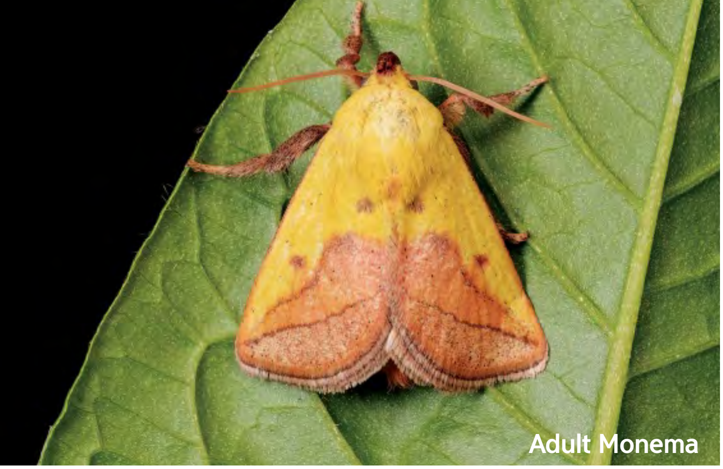
JADAM Natural Control Ratio

Refer to pages 25, 35~37

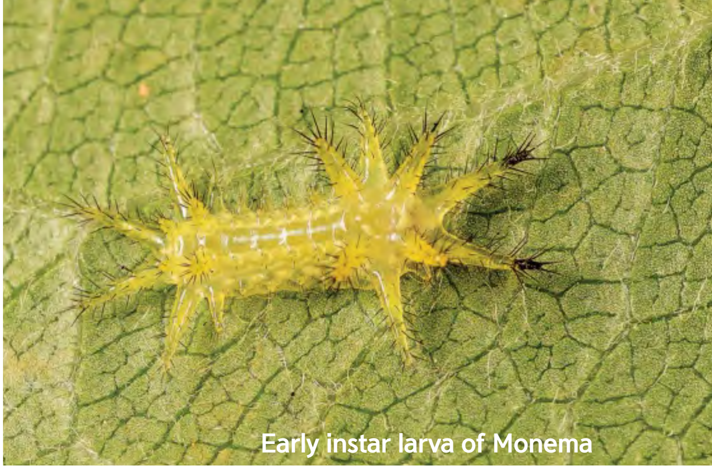
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	Visible effect	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

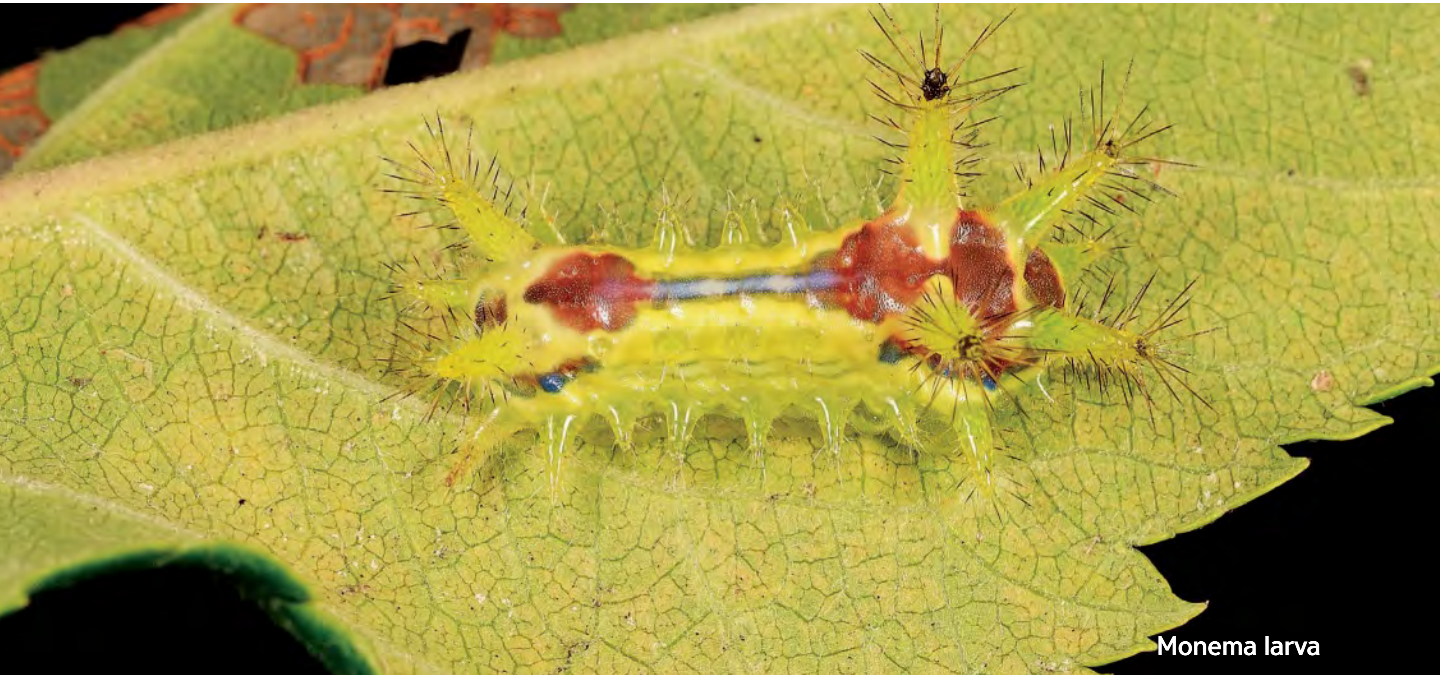
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



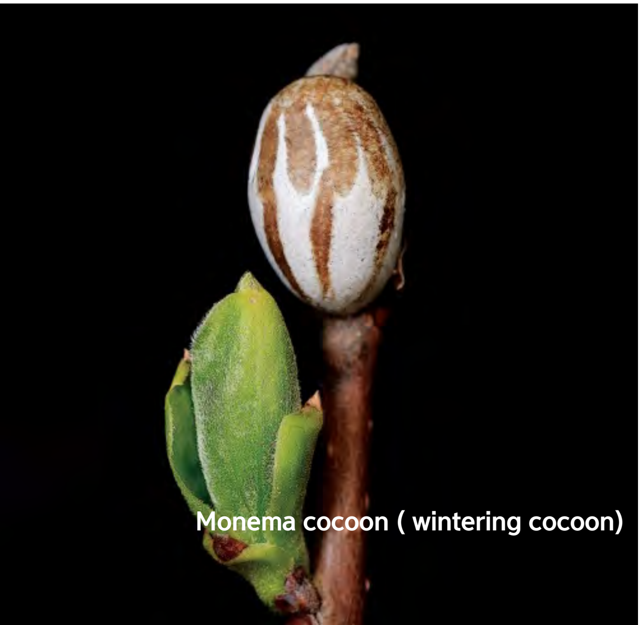
Adult Monema



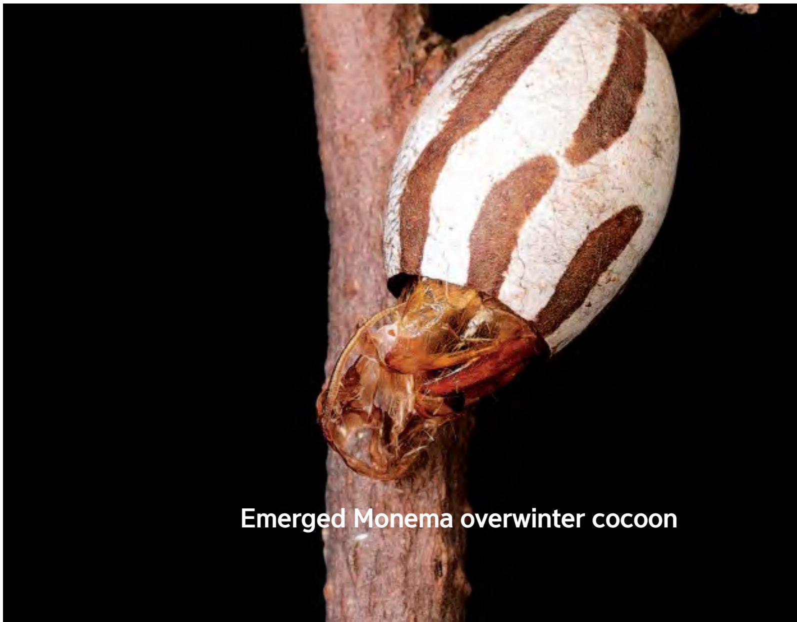
Early instar larva of Monema



Monema larva



Monema cocoon (wintering cocoon)



Emerged Monema overwinter cocoon

Tobacco cutworm, Cut worm

Spodoptera litura

Description

The fore wings of adults are brown or grayish brown with very complex patterns, the hind wings are grayish-white and transparent, the edges are gray, and the veins are often dark-colored. Body length is 15~20mm, and wing length is 30~38mm. The body color of the larva varies from dark brown to gray, and there are triangular black patterns on the back of each joint of the trunk on both sides, and there are two yellow spots on the dorsal surface of the second chest joint. The full-grown larva is 40-45mm.

Life cycle

Adults lay eggs over 2-5 days and spawn a batch of 100-300 eggs on the backside of leaves, and one female lays a total of 1,000-2,000 eggs a year. The egg mass is covered with hairy scales that have fallen from the end of the female's abdomen. The egg period is 2 to 15 days, which varies depending on the temperature, and the larvae generally go through 6 instar period, but it varies depending on the temperature, and the development period becomes shorter as the temperature increases.

An adult moth's lifespan is longer in males than females, with females of 9.8-11.7 days and males of 13.8-15.8 days. 5 generations occur annually. The first generation is in early May, the second generation is in mid-June, the third generation is at the end of July, the fourth generation is in late August, and the fifth generation is in mid-and late September.

Damage

More than 40 families and more than 100 types of plants are damaged, including vegetables such as cabbages, beans, radishes, potatoes, strawberries, and flowers such as roses and carnations. Almost all vegetables and crops, as well as fruit trees, flowers, Industrial crops, fodder crops, garden trees, weeds, street trees, etc., are injured, and young larvae hatched from eggs live in groups and disperse when they reach the second to third instar period. If the population is large, there are binge eating cases, leaving only the stem of the plant.

(National Crop Pest Management System/NCPMS)

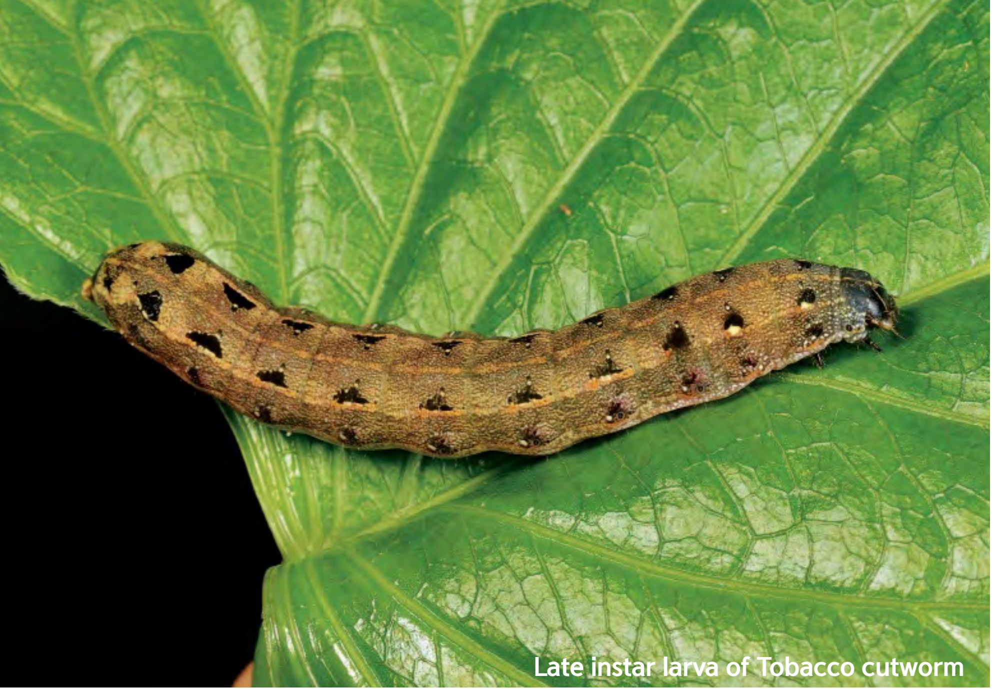
Refer to pages 25, 35~37

JADAM Natural Control Ratio

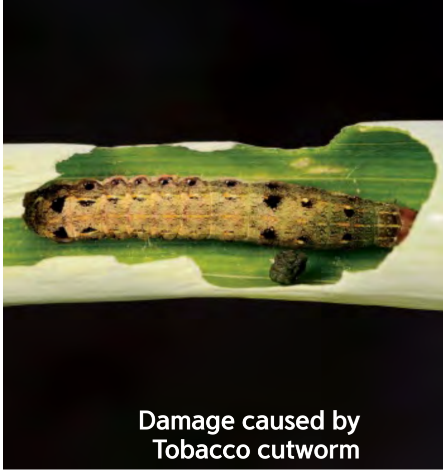
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	5days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

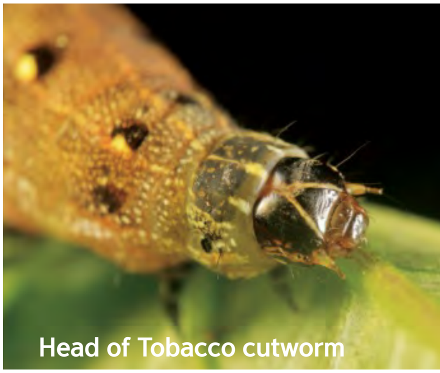
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



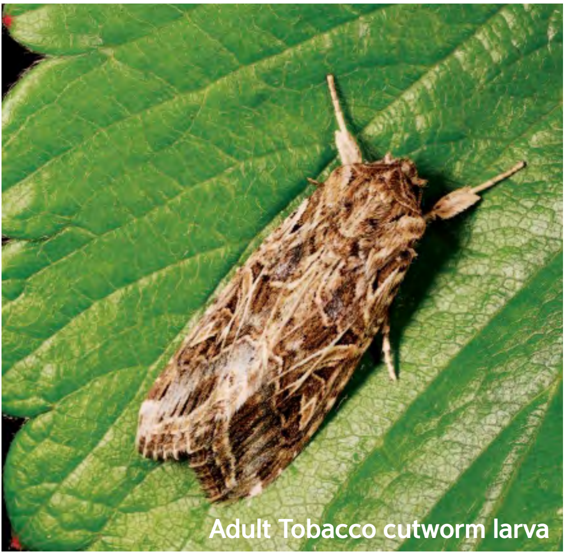
Late instar larva of Tobacco cutworm



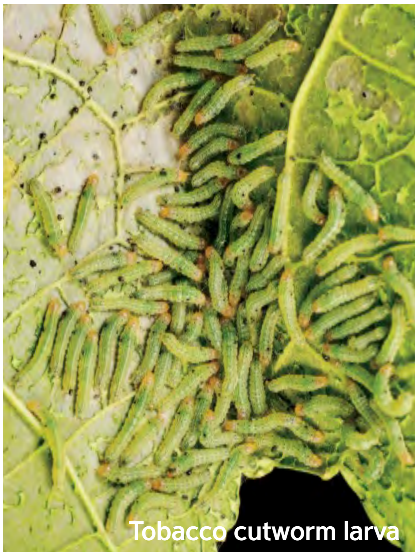
Damage caused by Tobacco cutworm



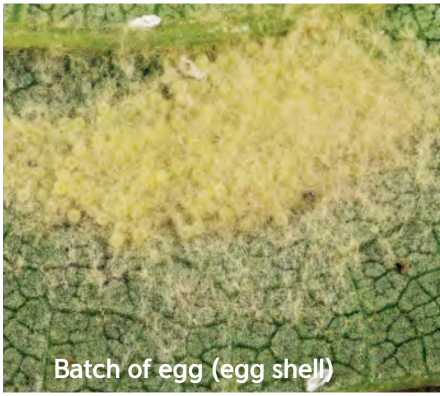
Head of Tobacco cutworm



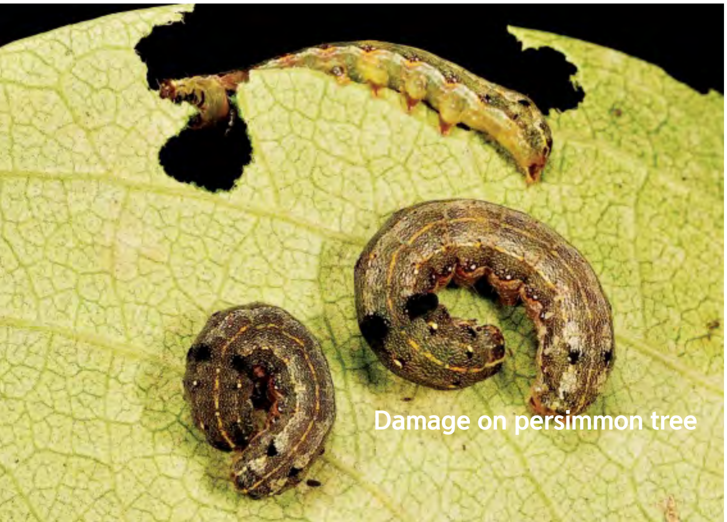
Adult Tobacco cutworm larva



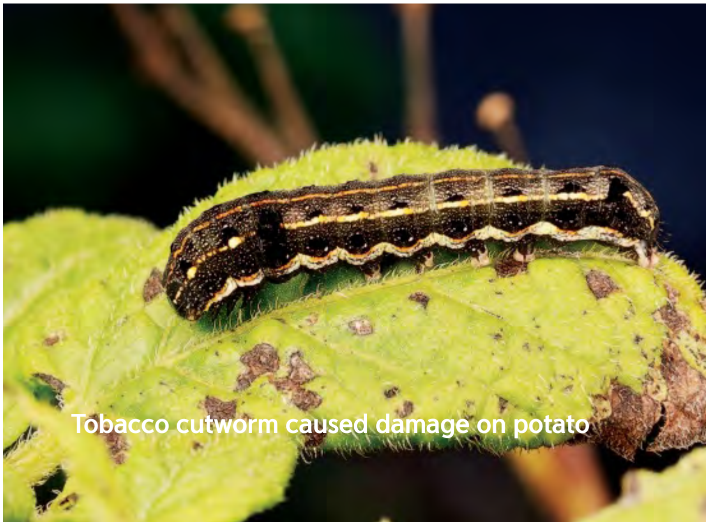
Tobacco cutworm larva



Batch of egg (egg shell)



Damage on persimmon tree



Tobacco cutworm caused damage on potato

Oriental tobacco budworm

Helicoverpa assulta

Description

The body color of adult insects is yellowish-brown, and the fore wings have brown wavy patterns. The body length is 17mm, and the wing length is around 35mm. Grown larvae are light green, with white patterns and gray-black spots around the back and body, their body length is about 40mm.

Life cycle

They occur 3 times a year and winter in the ground as a pupa. Peppers get the worst damage but more attacks happen on tobacco.

The first occurrence is from late May to mid-July, the second occurrence is from early to late August, and the third occurrence is from early September to mid-October. The most frequent occurrence is from late July to late August.

They spawn 1 at a time on fruits and leaves and spawn approximately 300 eggs in total. The egg period is 3 to 5 days. Adult insects are nocturnal, hiding behind the leaves during the day and appearing only at night. Young larvae damage day or night, but they are also active at night or on cloudy days after the third instar period. The larval period is 13 to 23 days, the first stage is short, and the second ~ third stage is long. The pupa lives at a depth of 4-7 cm under the ground, but some live on pepper plants. The pupae period is about 8 to 15 days. The spawning location is not easy to find because eggs are laid individually on the leaves, flowers, and pepper fruits.

Damage

Immediately after hatching from the egg, the tobacco moth's larvae pierce a hole in the pepper's fruit and eat the inside of the fruit. The fruit that has been damaged is softened and eventually decays and falls off.

(National Crop Pest Management System/NCPMS)

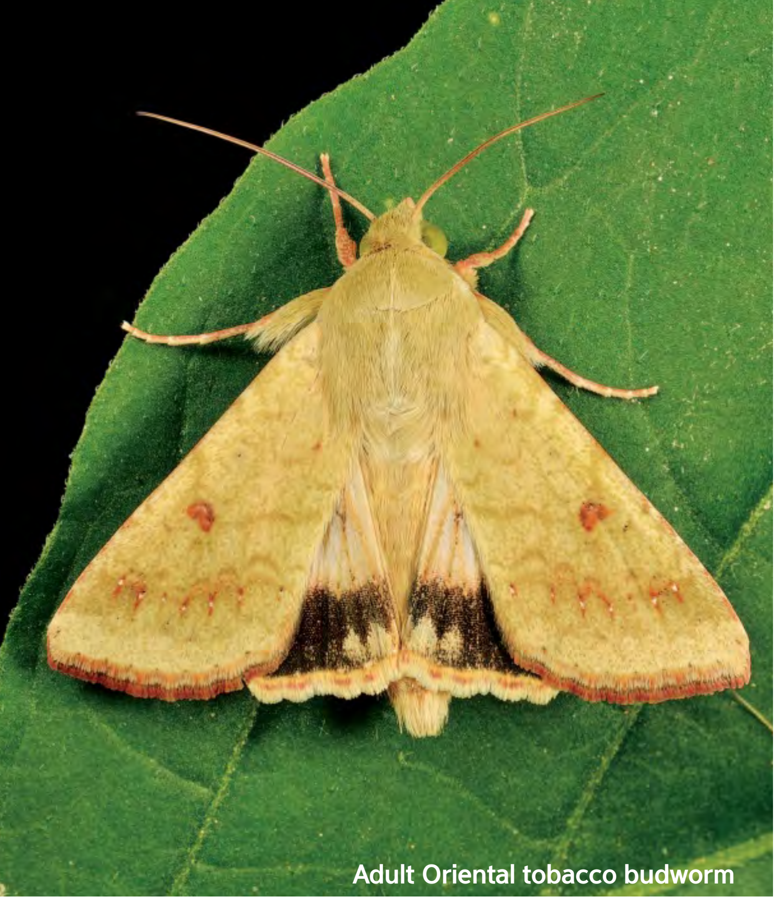
Refer to pages 25, 35~37

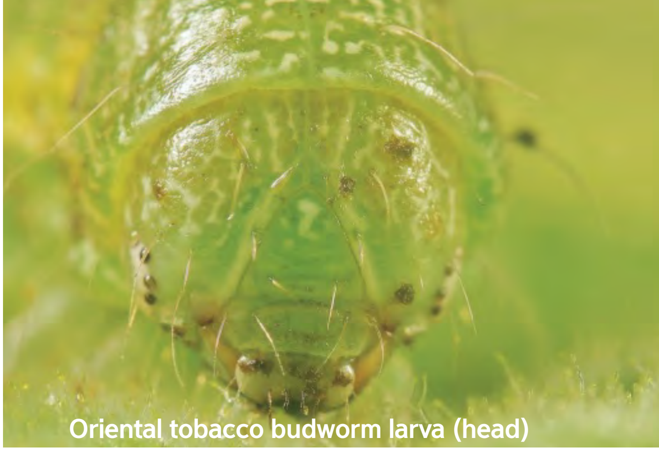
JADAM Natural Control Ratio

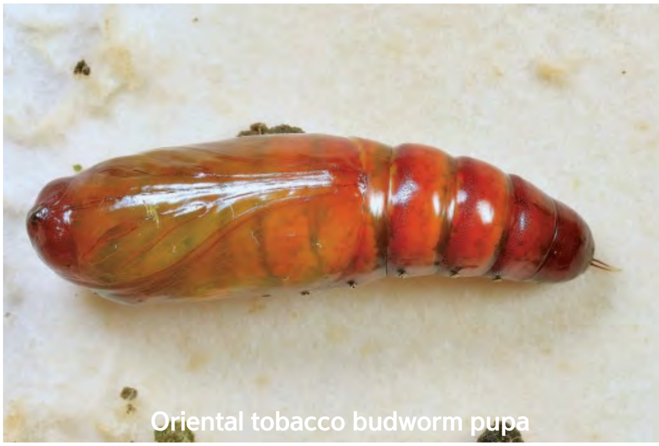
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	5days	Visible effect	10 minutes

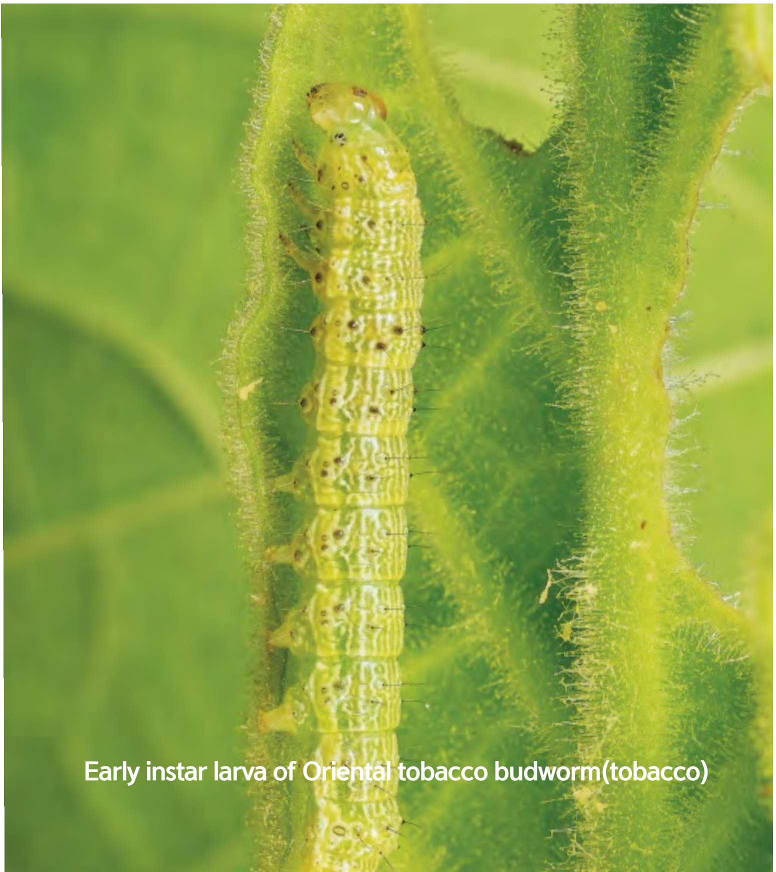
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

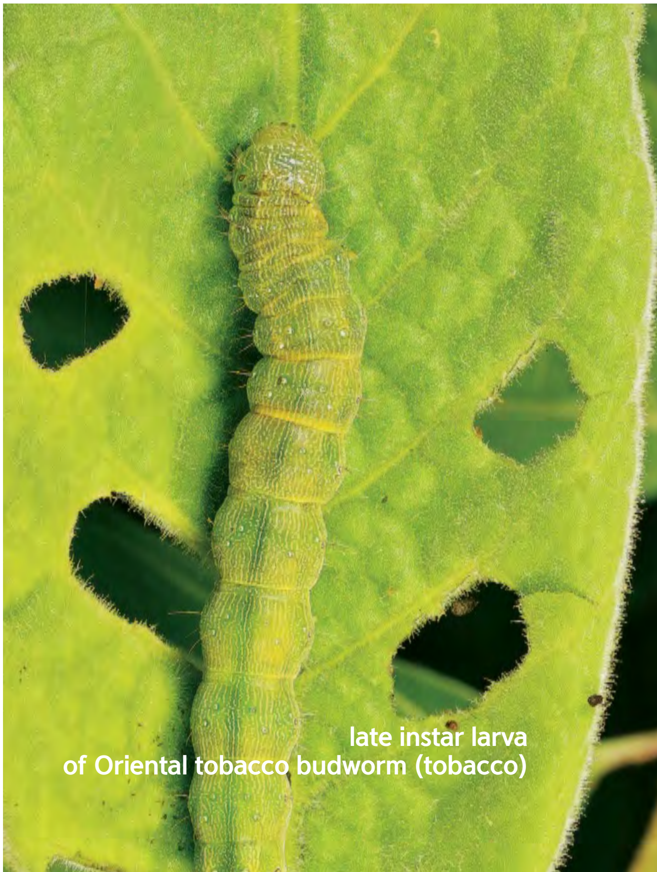
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Oriental tobacco budworm


Oriental tobacco budworm larva (head)


Oriental tobacco budworm pupa


Early instar larva of Oriental tobacco budworm(tobacco)


late instar larva
of Oriental tobacco budworm (tobacco)

Jujube leafroller

Ancylis sativa

Description

Late instar larvae have a body length of about 15mm, and their head and pronotum are dark brown, and their body is yellowish-brown. Adult insects have a wing length of 12-14mm, which is brown, and when the wings are folded, both ends of the wings are pointed and look like horns.

The estimated occurrence is three times a year and they winter as a pupa or adult insect. Adults appear in April-August, and larvae appear in May-September. (Deokgi Park)

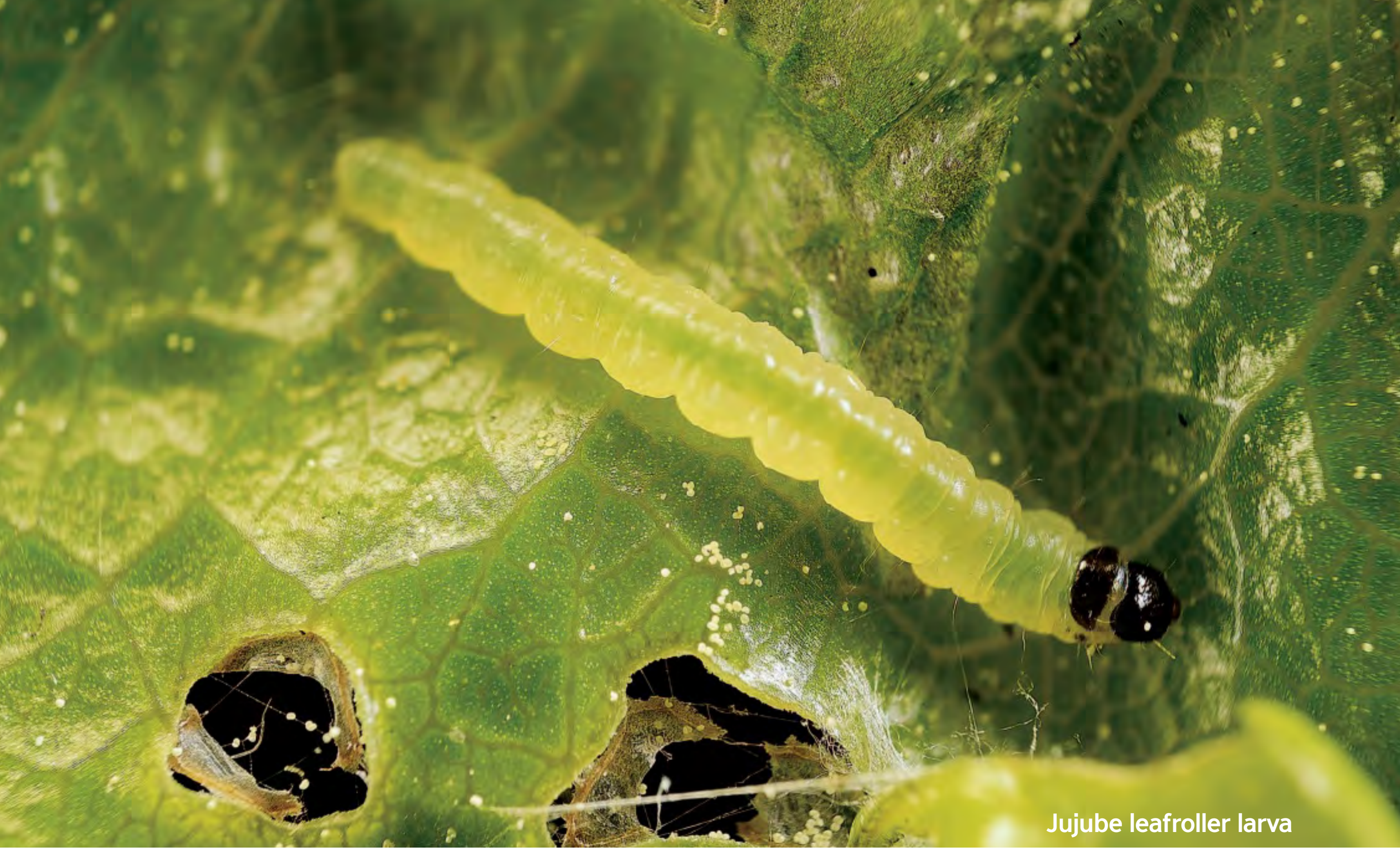
JADAM Natural Control Ratio

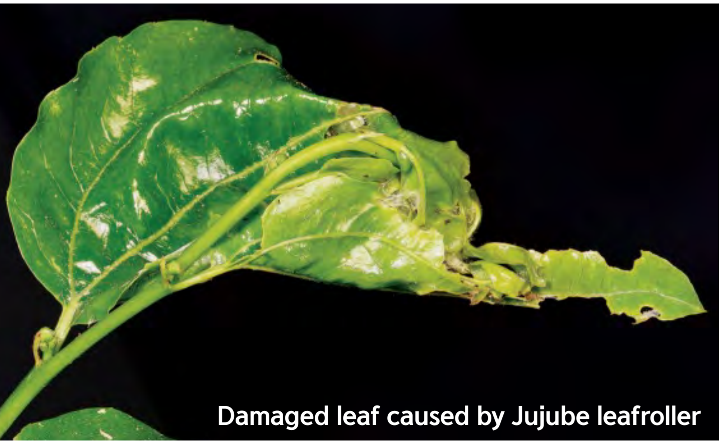
Refer to pages 25, 35~37

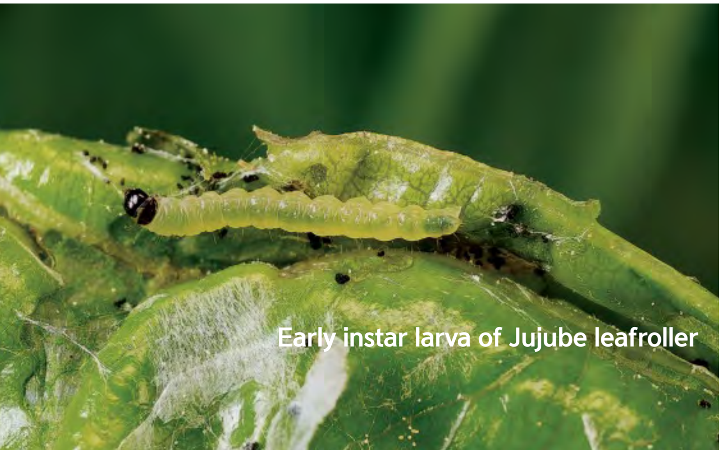
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	10minutes

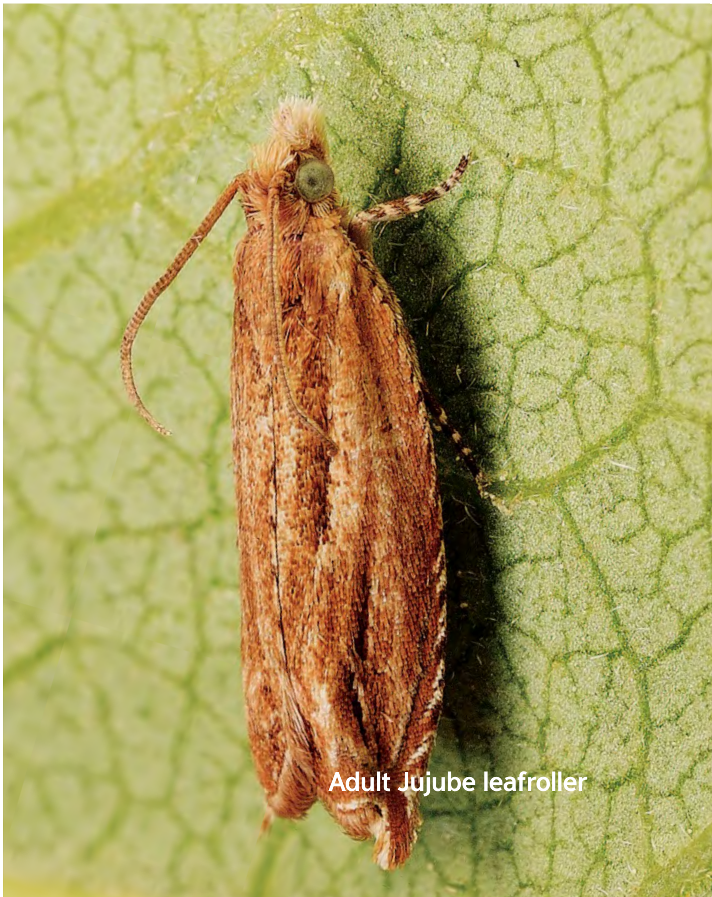
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Jujube leafroller larva


Damaged leaf caused by Jujube leafroller


Early instar larva of Jujube leafroller


Adult Jujube leafroller

Cabbage moth

Mamestra brassicae

Description

The length of the wings of an adult insect is 40-47mm, they are grayish-brown to blackish brown, and there are black and white complex patterns on the fore wings. The larva turns green or black-green while eating leaves. Mature larvae are 40mm, and the head is light green to yellowish-brown. The body is gray-black with many dark brown spots.

Life cycle

They occur twice a year and live through winter as a pupa. The First adult insects appear in April-June, and the second adult insects appear in August-September. The larval period is 40 to 45 days. Adult insects begin their activities at sunset and hide among dry leaves during the day.

They attack in a group until the third instar period and after the fourth instar period, they spread and become a pupa in the ground. They come up as a group on cabbage leaves and look for larvae that gnaw the leaves at sunset.

Damage

Because it is omnivorous, about 10 species of the host are known, and it is known as an insect pest of horticultural crops such as vegetables and flowers.

The damage is severe in spring and autumn, and it damages by digging inside of the cabbage.

(National Crop Pest Management System/NCPMS)

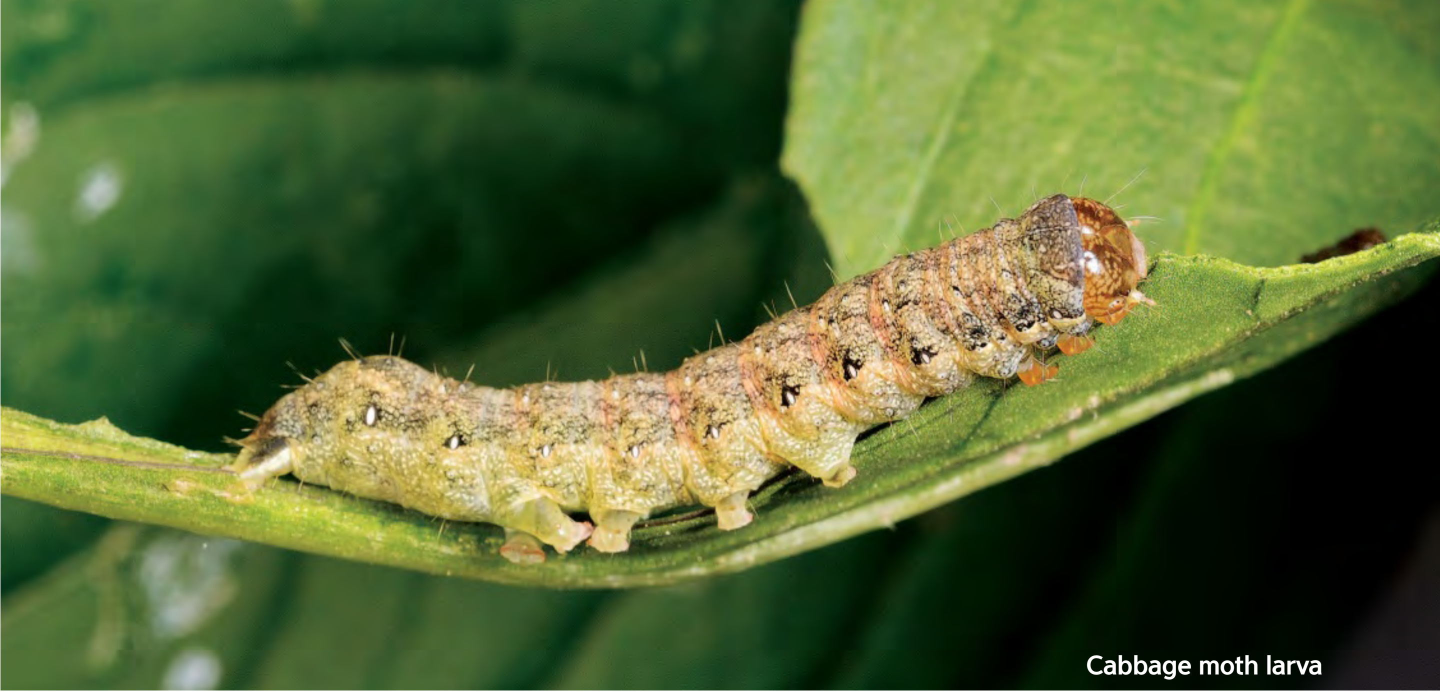
JADAM Natural Control Ratio

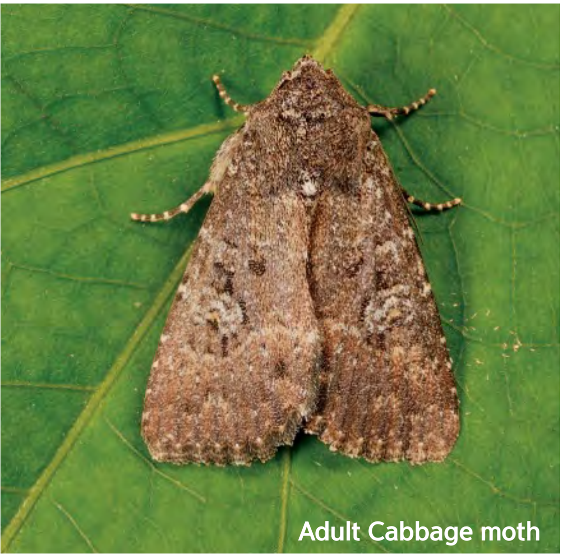
Refer to pages 25, 35~37

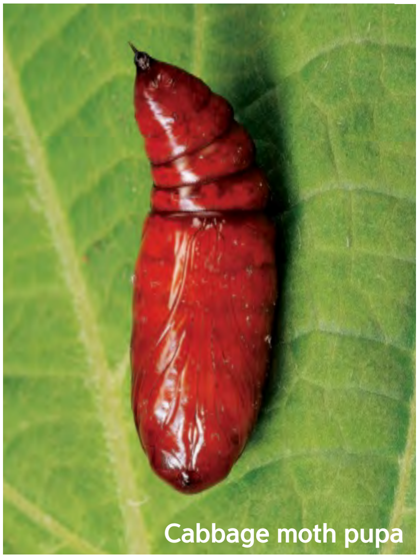
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	5days	**Visible effect**	10 minutes

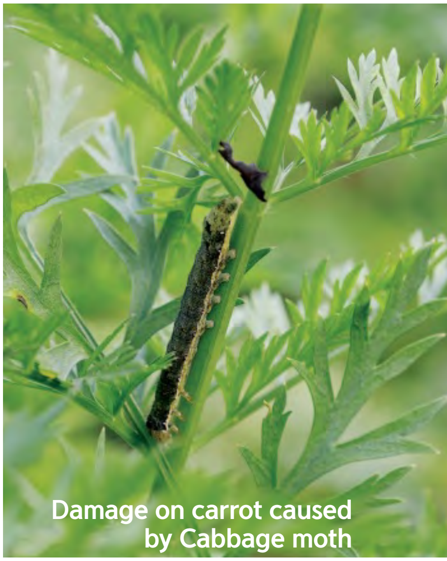
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

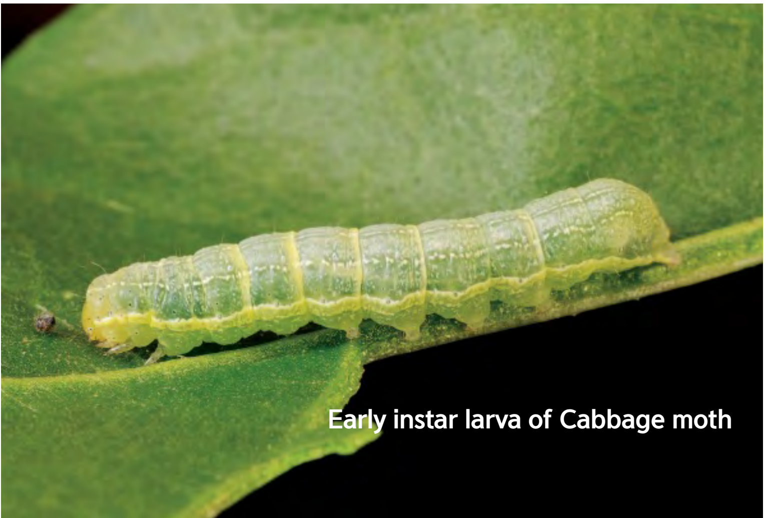
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

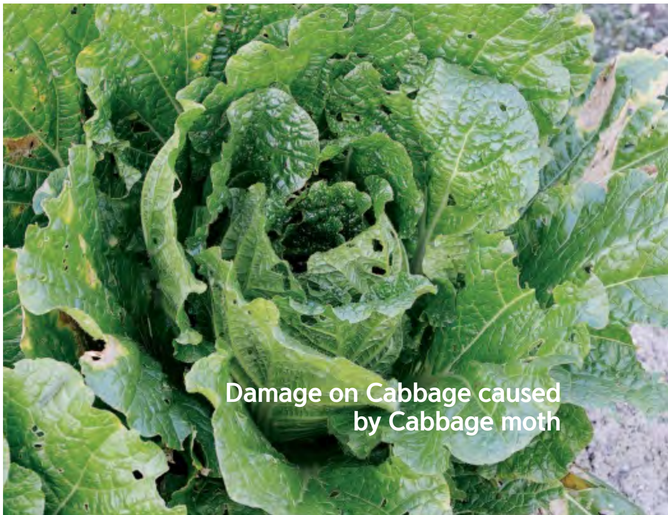

Cabbage moth larva


Adult Cabbage moth


Cabbage moth pupa


Damage on carrot caused by Cabbage moth


Early instar larva of Cabbage moth


Damage on Cabbage caused by Cabbage moth

Plum leafroller

Rhopobota naevana

Description

It overwinters as an egg on stems and branches. It is a small grayish-brown moth, with dark brown spots on the fore wings and diagonal lines on the leading edge, but many changes depend on the individual. The hind wings are grayish-white, and the outer edge is slightly dark. The pupa is fusiform and yellowish-brown.

The body length of the larva is about 10mm and the head of the larva is black. It is dark green when it is young, but it may be bright red or yellowish-white depending on the individual when it grows. Eggs are flat oval, milky white to orange-red, eggshells are transparent and have turtle-shaped spots on the surface.

Life cycle

Hatched larvae inflict damage by rolling the surface of a leaf inward, leaving only the backside of the leaf. Since adult insects occur five times a year in May-October, the outbreak is very complex. The average number of spawning is 22, and eggs are laid individually on leaves' front and rear branches.

Homeless larvae fold the edge of the leaf , make a white cocoon in it, and then become a pupa. The damage is severe from the end of July (2-3 episodes), and is the most severe from the end of August to the beginning of September (3-4 episodes)

Damage

The larvae turn the leaves brown, which affects the aesthetics. (Korea National Arboretum)

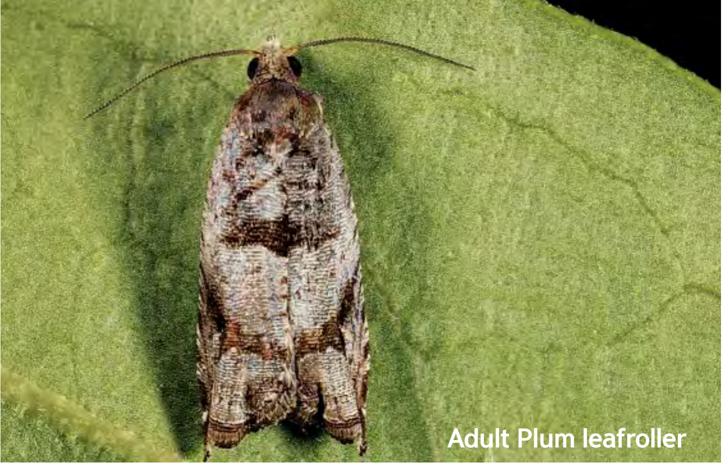
Refer to pages 25, 35~37

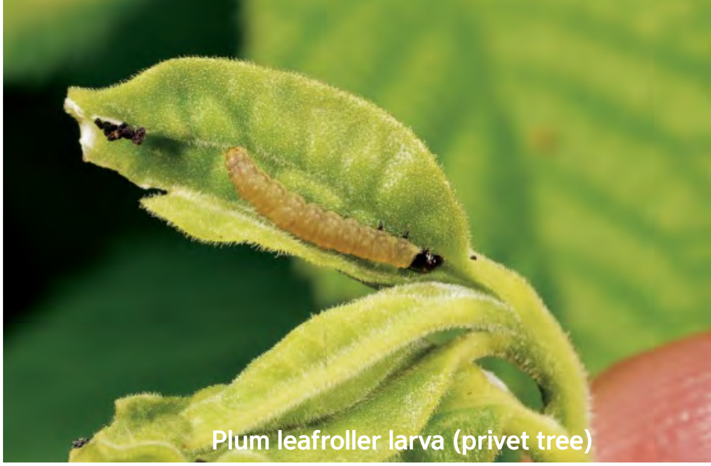
JADAM Natural Control Ratio

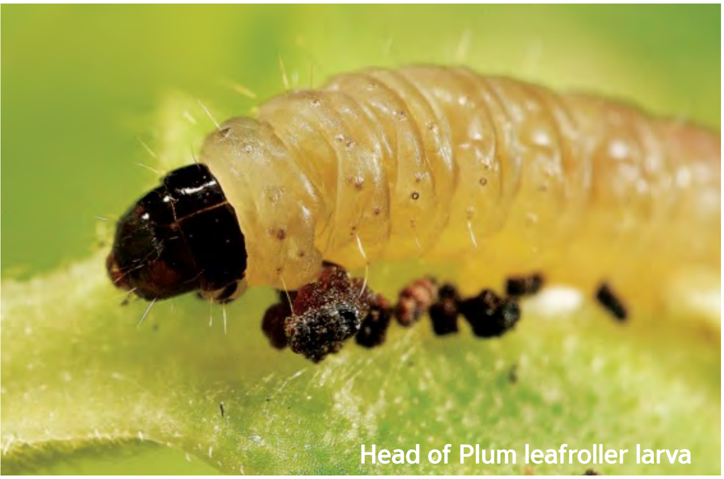
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	30minutes

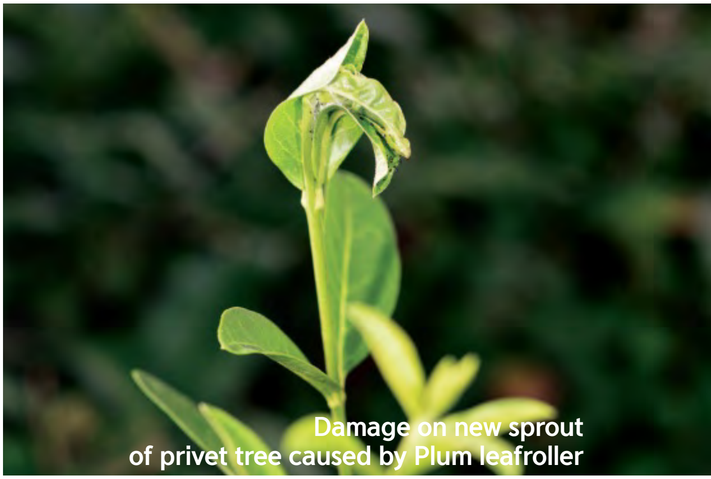
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- The leaf curling occurs. Then, because aphids are difficult to control, periodic control is required in early spring when aphids are expected to occur.

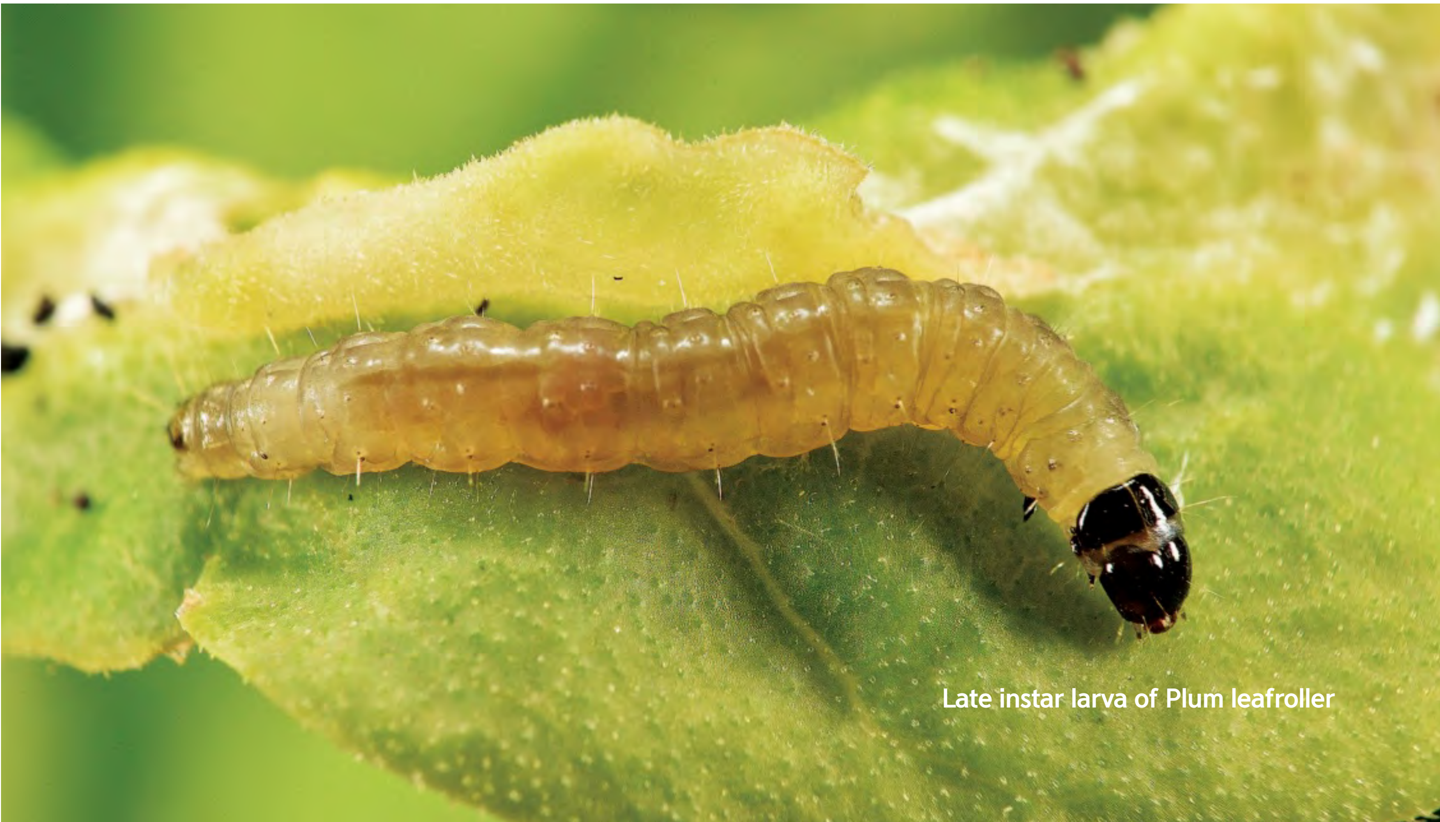
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Plum leafroller


Plum leafroller larva (privet tree)


Head of Plum leafroller larva


Damage on new sprout
of privet tree caused by Plum leafroller


Late instar larva of Plum leafroller

Lettuce shark

Cucullia fraterna

Description

The length of the wing is 19-20mm. The fore wing is dark gray, slightly black along the vein's periphery, and the lower part of the base is yellowish-white. The hind wings are dark brown on the outside and pale on the inside.

Life cycle

Adult insects appear twice a year in May-June, and August-September. It is also a major pest of lettuce that usually has relatively few pests.

(Korea National Arboretum)

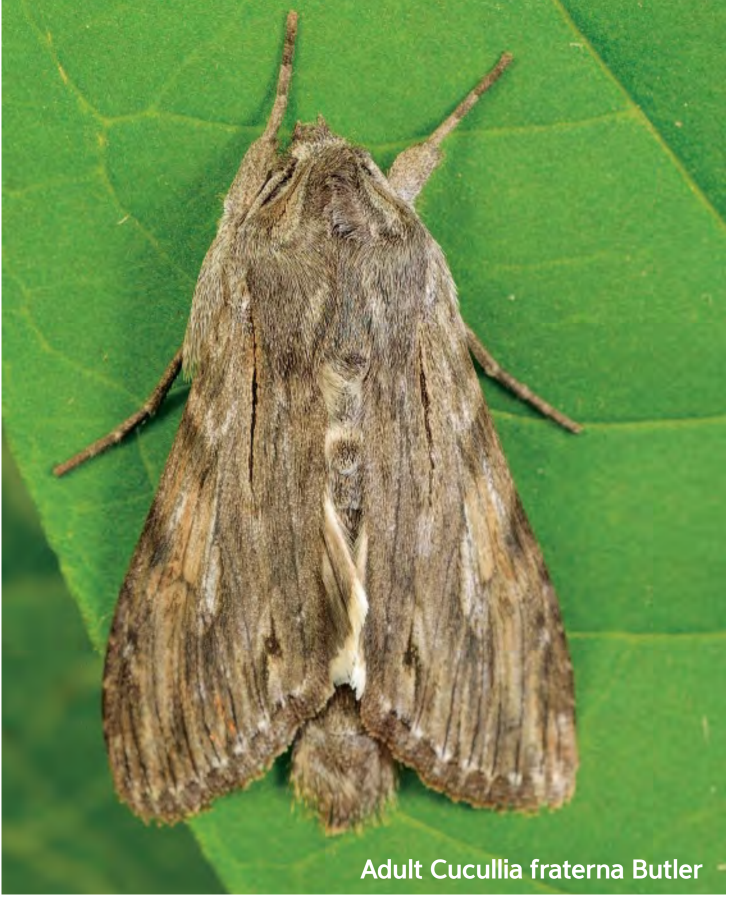
Refer to pages 25, 35~37

JADAM Natural Control Ratio

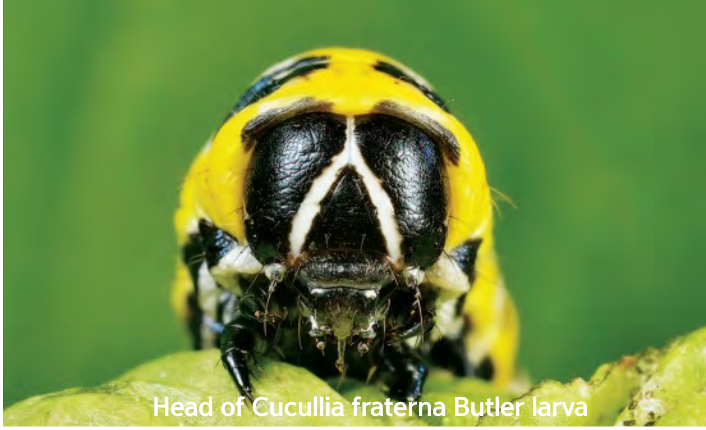
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		300ml	500ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	7days	**Visible effect**	30minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

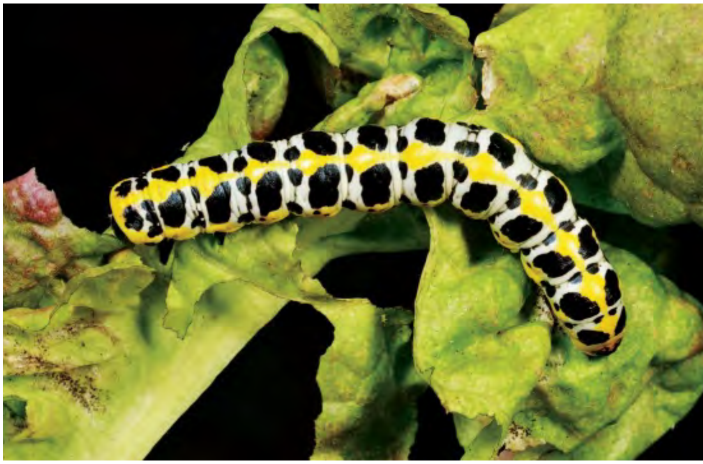
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

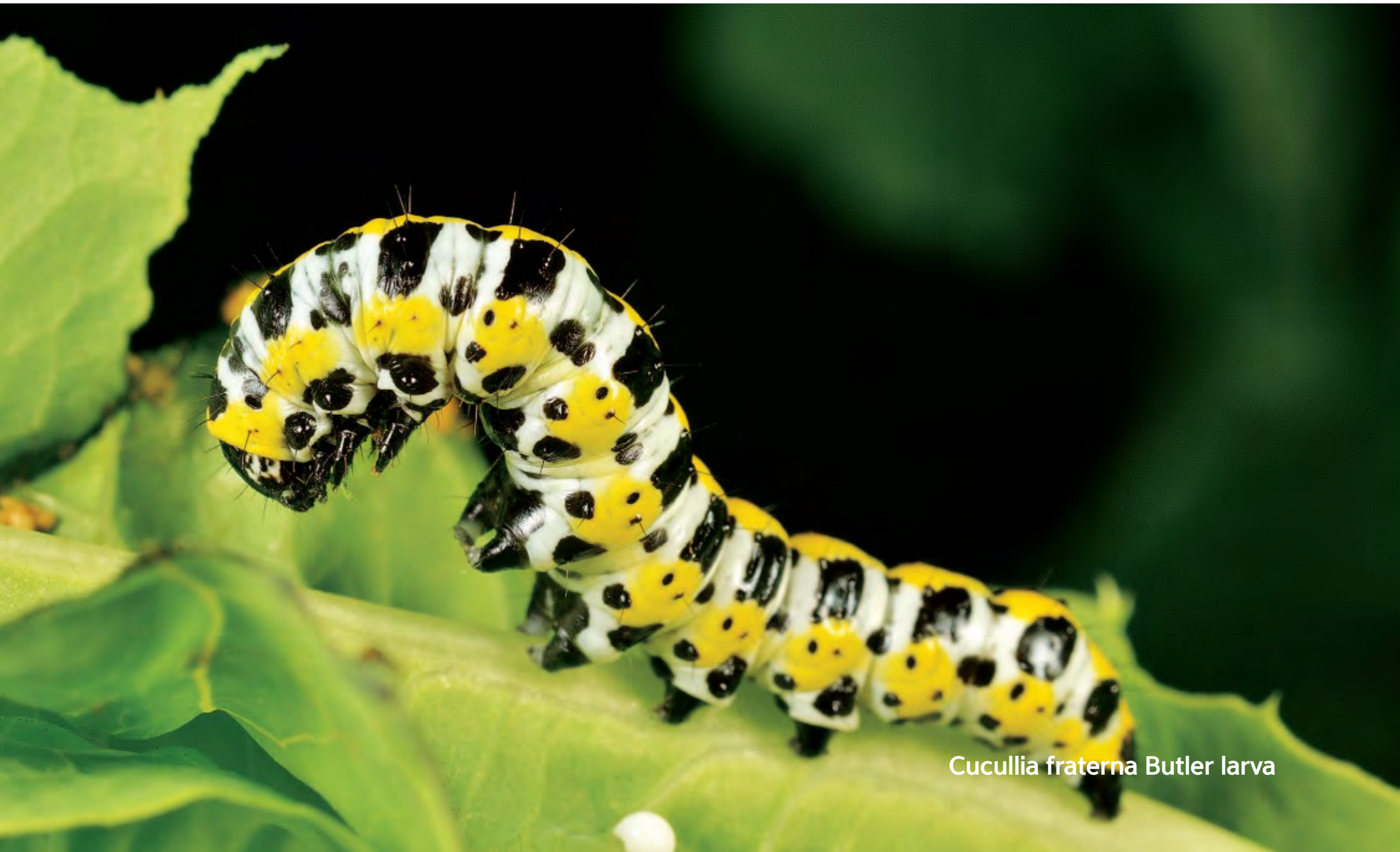


Adult Cucullia fraterna Butler



Head of Cucullia fraterna Butler larva





Cucullia fraterna Butler larva

Cotton caterpillar

Diaphania indica

Description

The wingspan of adult insects is about 25mm. The front and hind wings have a clear blackish-brown pattern on the outer border on a white background. There are no other patterns on the inside of the border, so they are easily distinguished from similar species, such as the Box tree moth (Glyphodes perspectalis) or Glyphodes quadrimaculalis. Half of the head and thorax are blackish brown, and there is a clear black band at the end of the abdomen.

Life cycle

They build cocoons in the gaps of buildings and tree trunks and winter as pupa. One adult insect occurs around June, and the third adult occurs around July, the occurrence is not constant after this period. They have over three generations a year.

Females are scattered on the backside of leaves, and larvae eat the leaf, leaving only the surface layer, and when growing, they eat only leaf veins while making cocoons in a dried leaf to live.

Damage

The larvae gnaw on the leaves of cucumber, melon, cotton, mallow, and mulberry trees, leaving only side veins. Also, it degrades the product's value by crushing into the skin of the fruit.

(National Crop Pest Management System/NCPMS)

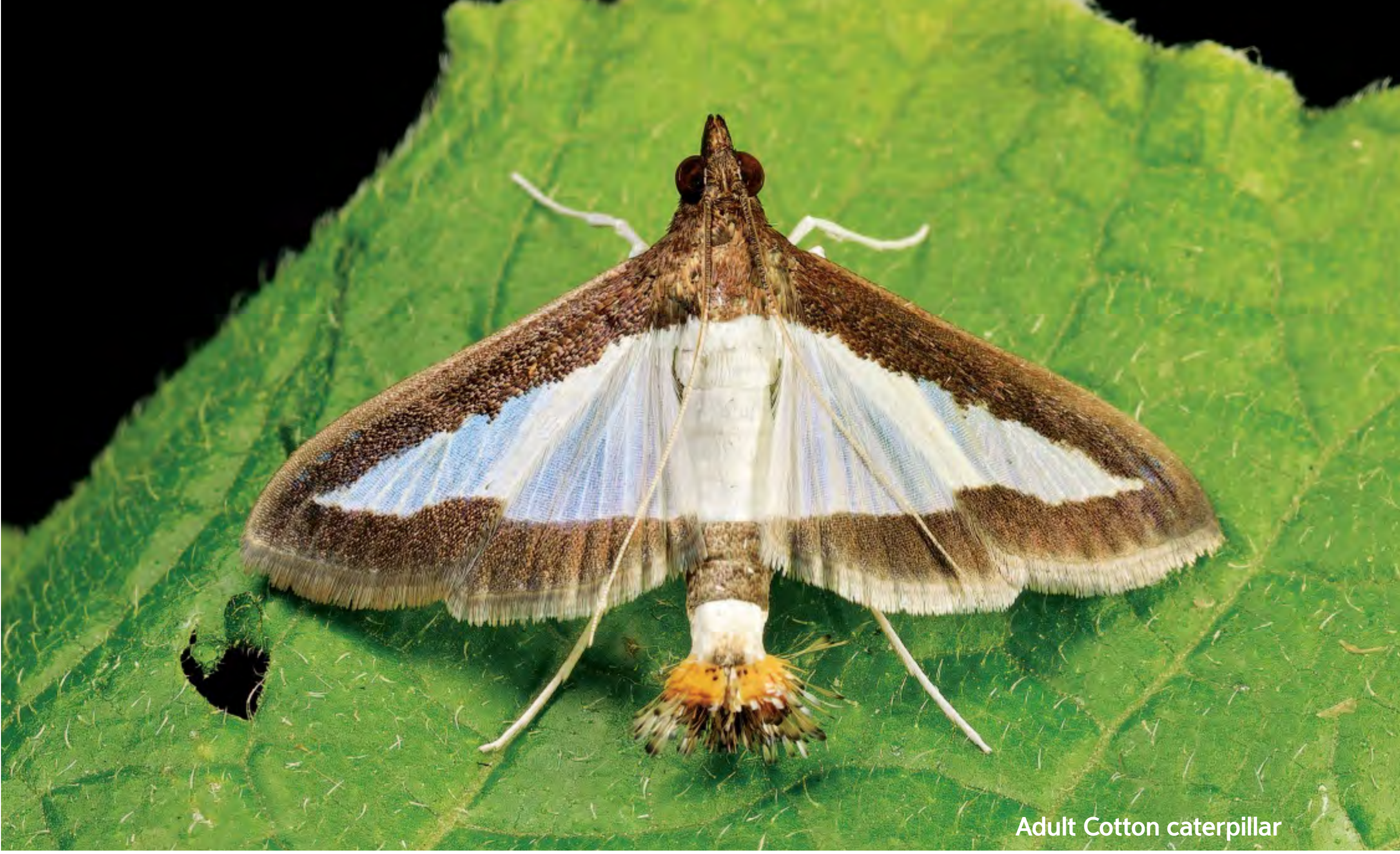
Refer to pages 25, 35~37

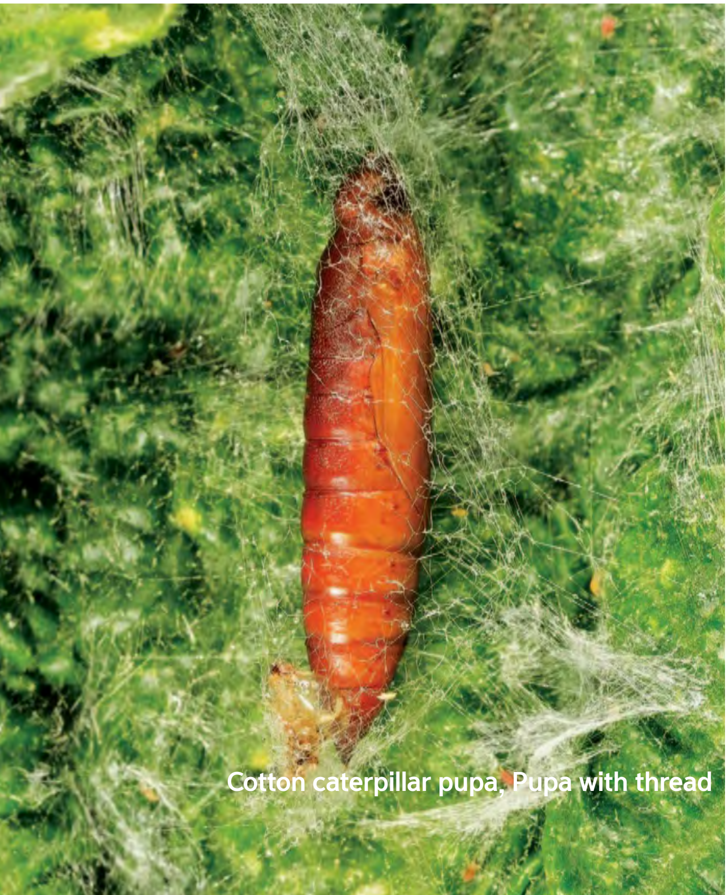
JADAM Natural Control Ratio

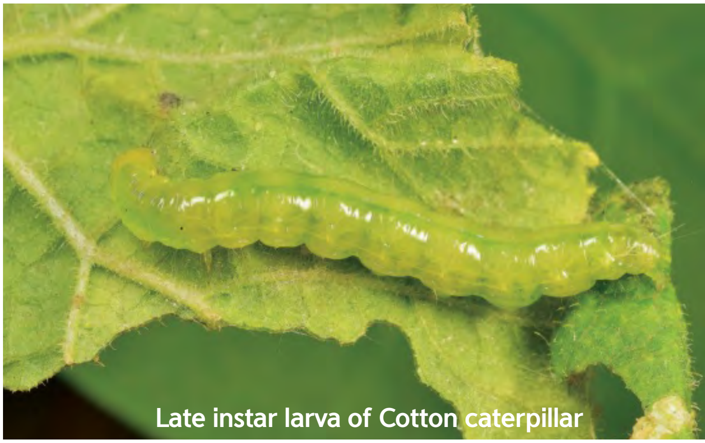
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	10 minutes

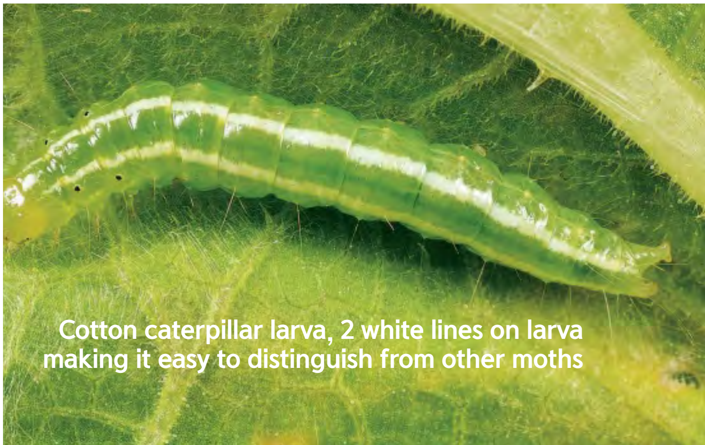
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Cotton caterpillar


Cotton caterpillar pupa, Pupa with thread


Late instar larva of Cotton caterpillar


Cotton caterpillar larva, 2 white lines on larva making it easy to distinguish from other moths

Fall webworm

Hyphantria cunea

Description

The body length of adult insects is 12-14mm for females and 9-10mm for males, and the length of unfolded wings is 36-37mm for females and 28-30mm for males. The wings of the first emerged adult from the wintering pupae, have black spots on a white background, but the second and third emerged adults are white. Both male and female antennae are serrated, but males are feather-shaped. The diameter of the egg is about 0.5mm, it is spherical, and it has a pale green color, but it turns gray-black when it is time to hatch.

Life cycle

They usually occur 2 to 3 times a year and make cocoons between the bark or under the ground cover and winter as a pupa. The first adult emerges from mid-May to early June and has a 4 to 5 days lifespan. The number of female egg spawning depends on the feed, and spawns about 600-700 eggs in piles on the leaves' backside.

Caterpillars hatched from the end of May, vomit thread, wrap the leaves until the fourth instar period. They live as a group, eating only the leaf, scattering from the fifth instar period, leaving only leaf veins, and damage until mid-late July. The second stage of adult insects emerges from the end of July to the middle of August. Caterpillars start hatching from the beginning of August, and attack until the beginning of October, they become pupae and go into wintering. At this time, the pupa period is about 200 days.

Damage

The amount of leaves eaten by one larva reaches 100~150㎠. Up to the third instar larvae, they vomit thread, remove leaves, and live collectively. They disperse and damage after the fourth instar period. Damage is easily noticeable from street trees or garden trees, they severely damage the landscape. (National Crop Pest Management System/NCPMS)

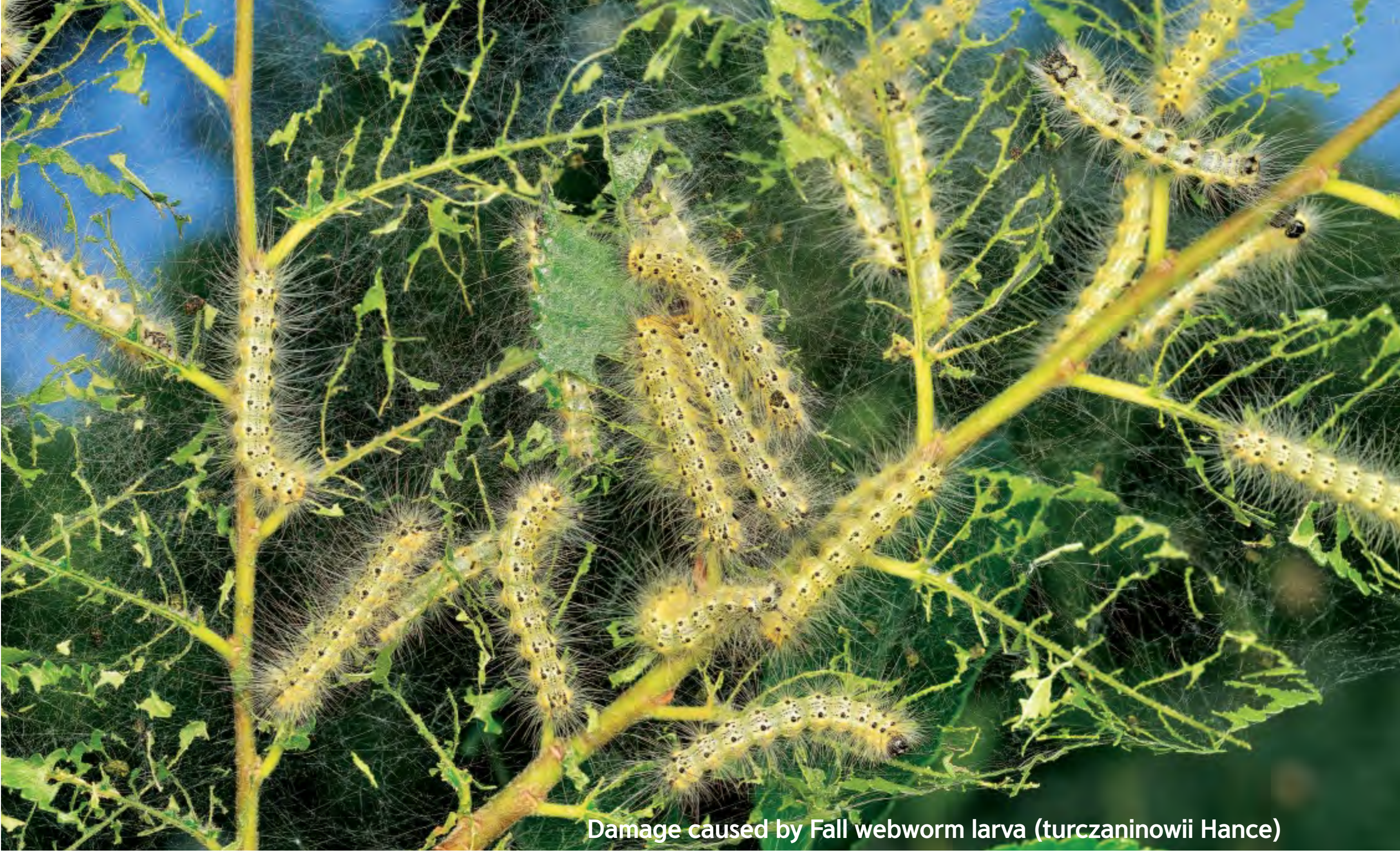
JADAM Natural Control Ratio

Refer to pages 25, 35~37

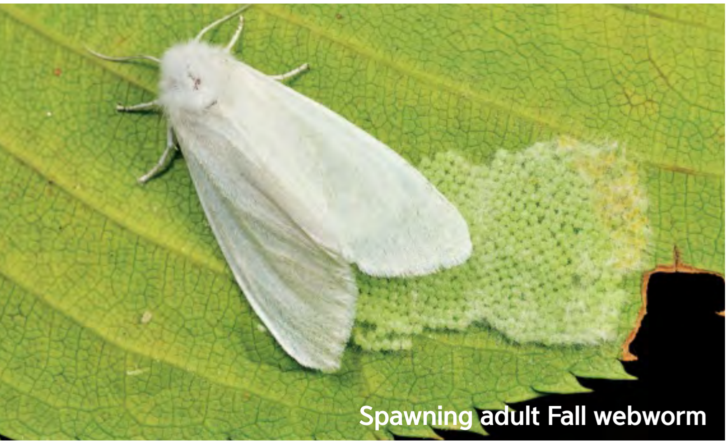
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	7days	Visible effect	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- This pest has a lot of silver hair, so move the spray from side to side to get it wet enough.

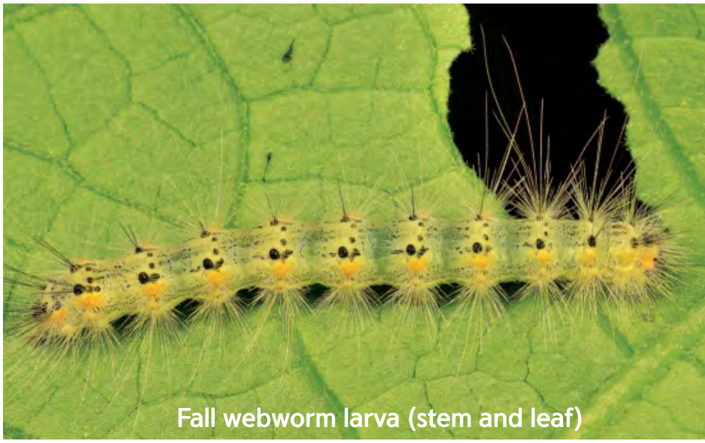
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Damage caused by Fall webworm larva (turczaninowii Hance)



Spawning adult Fall webworm



Fall webworm larva (stem and leaf)

Head of Fall webworm

Damage caused by Fall webworm larva
(persimmon tree)

Cabbage webworm

Hellula undalis

Description

The body length is around 7mm, and the length of the wingspan is 14mm. The fore wing is a little yellow, there is a black kidney pattern in the center, and there are 2 wave patterns in the 1/3 position. The hind wing is grayish-white and slightly brownish toward the end. The hind legs are long, there are long hairs on the joints, the head is black, and there are two dark spots.

The egg is oval, the long side's diameter is within 1mm, there are vertical wrinkles, and it is pale yellowish-white but turns orange-yellow before hatching from the egg. The larva is about 12mm long. and has a dark brown head with a horizontal line. There are small black spots and fine hairs on each node. It becomes pupa inside of the rolled leaf. the pupa is about 10mm brown.

Life cycle

They occur 2-3 times a year and spend winter as a pupa. The first outbreak begins in April, and eggs are spawned on cruciferous vegetables and tobacco sprouts. The larvae hatched from the egg crawl on the leaf's surface, but it rolls the leaf with thread and eats from inside the leaf as it goes into the second instar period.

During the fifth instar period, it goes in between threads to be ready for pupated without harming the leaf. And turns yellow and becomes a pupa. The second occurrence is in June, and the third occurrence is in August. If there is a lot of rain at high temperatures, the damage is severe, and an adult insect's lifespan is about 10 days.

Damage

It is a pest that occurs on cruciferous vegetable crops such as Chinese cabbage. Damage that occurs in the early stages of crop cultivation is not common, but it causes fatal damage by eating cabbage sprouts and stopping the plant's growth. The larvae eat cruciferous vegetables and tobacco sprouts, causing damage to the growing point. A severely damaged crop does not continue to grow and it becomes yellow and dies.

(National Crop Pest Management System/NCPMS)

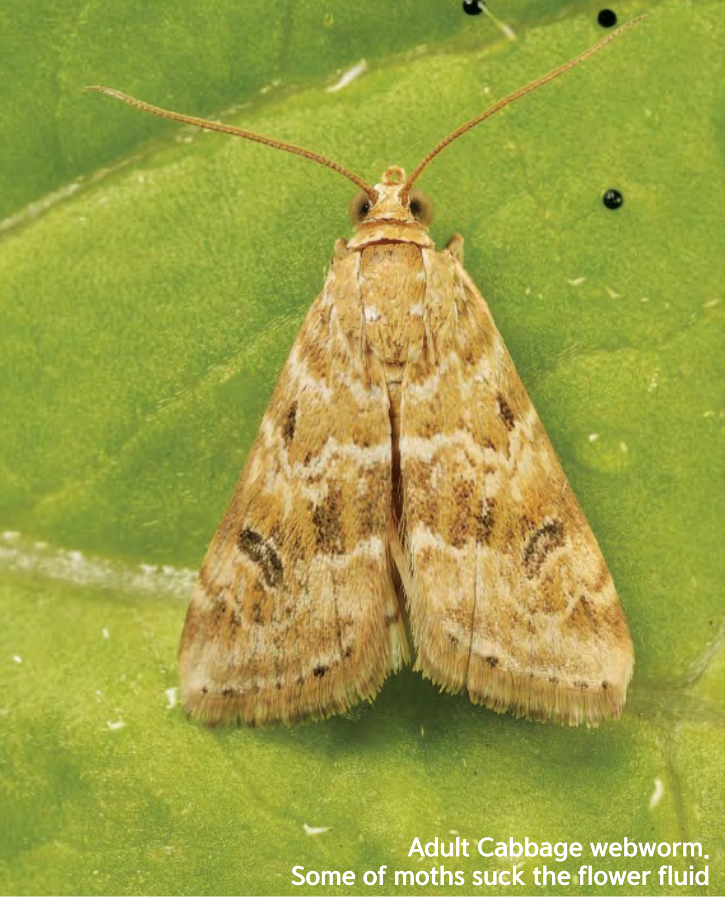
JADAM Natural Control Ratio

Refer to pages 25, 35~37

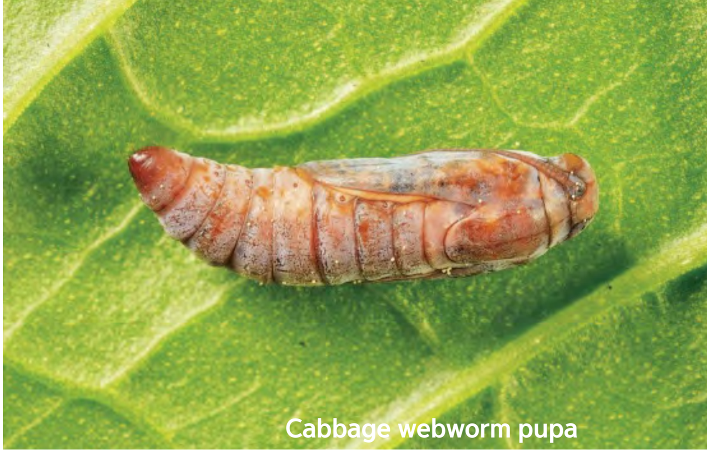
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Spray to get wet enough.

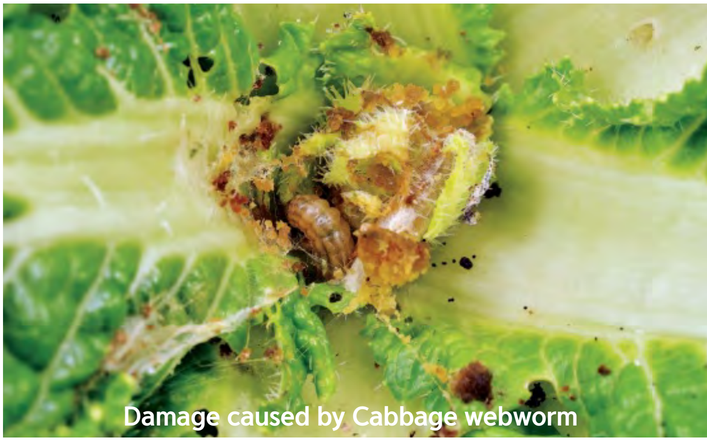
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



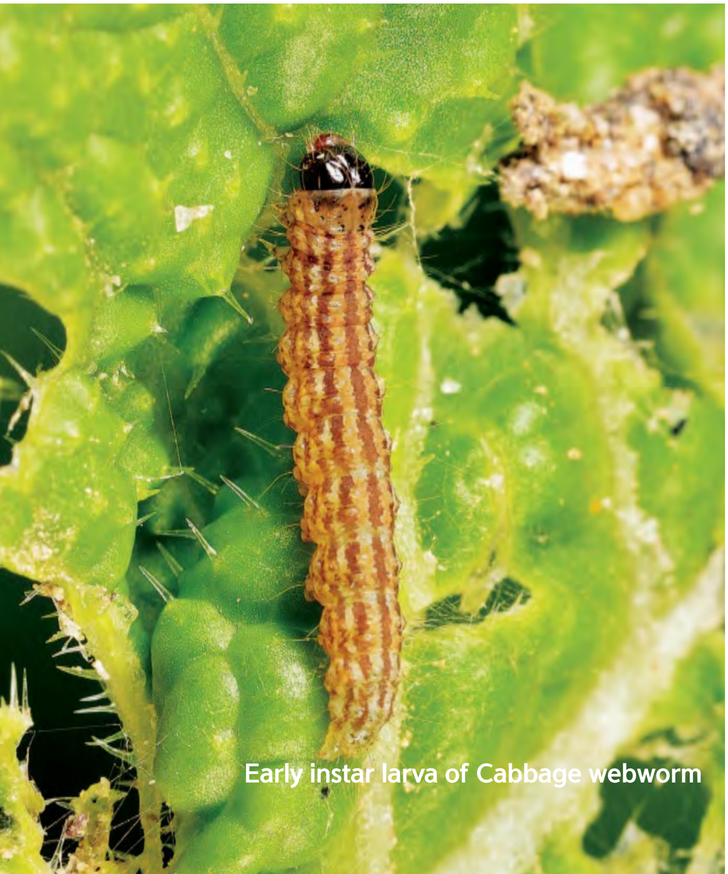
Adult Cabbage webworm.
Some of moths suck the flower fluid



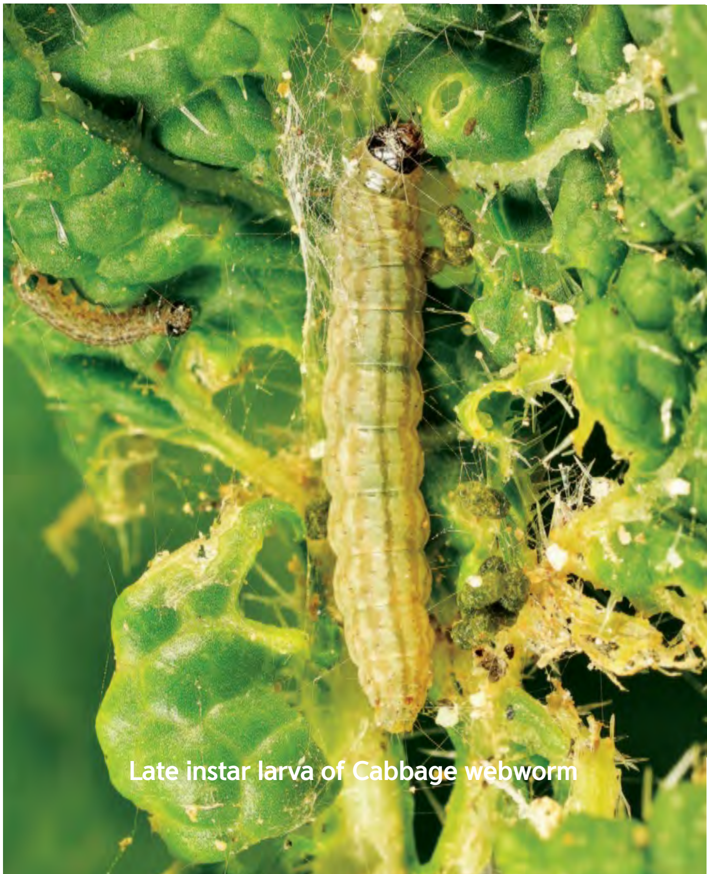
Cabbage webworm pupa



Damage caused by Cabbage webworm



Early instar larva of Cabbage webworm



Late instar larva of Cabbage webworm

Diamondback moth

Plutella xylostella

Description

Diamondback moth larvae have a light brown head, and when fully grown, their body length is around 10㎜. The pupa's size is around 6 mm, the body color is green, pale yellow, or black, and is contained in a net-shaped cocoon.

Adult insects have dark grayish brown or light gray-brown fore wings, and when the wings are folded, it has a sulfur-white diamond-shaped pattern on the center of the back. The body length is about 6mm. Eggs are yellowish-white, flat, and about 0.5㎜ long.

Life cycle

It winters in the region where the average monthly temperature in winter (December-February) is 0℃ or higher, and growth temperature is 7℃ or higher. The peak season occurs from late August to early September in the highland vegetable cultivation regions. The annual number of occurrences is estimated to be between 8 to 12 generations in subtropic regions. The first generation is usually 20-25 days, and one adult lays 100-200 eggs. The occurrence is identifiable with small holes on the leaves of vegetables. Adults, larvae, and pupa can be checked with the naked eye.

Damage

It harms cruciferous vegetables such as cabbage, Chinese cabbage, radish, and rapeseed, and leaves of weeds such as radish. In the early stage, young bugs dig a burrow into the lobe of a plant, leaving only the epidermis and gnawing the lobe from the back of the leaf to leave white epidermis, and in severe cases, it pierces a hole and leaves only the leaf veins, and eats the entire leaf.
(National Crop Pest Management System/NCPMS)

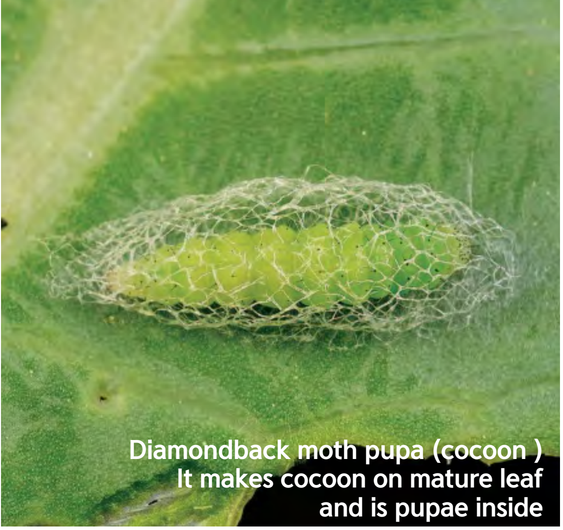
Refer to pages 25, 35~37

JADAM Natural Control Ratio

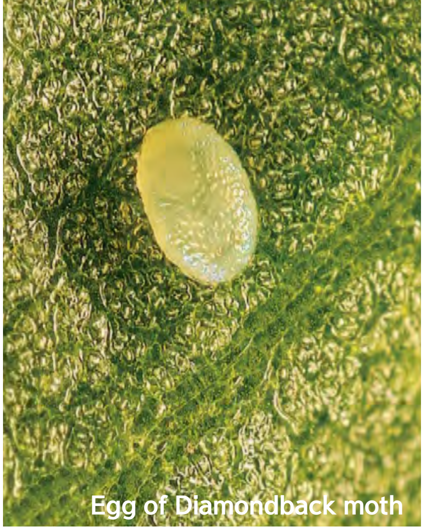
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	7days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

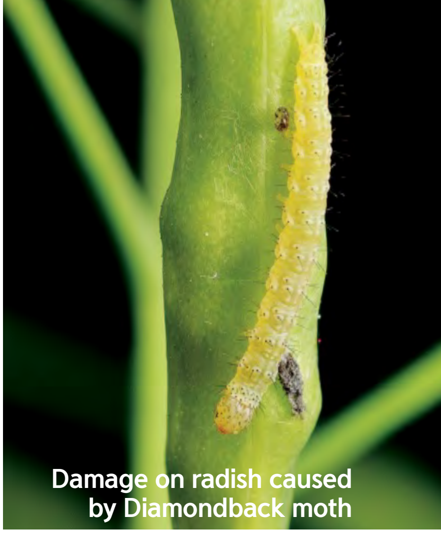
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



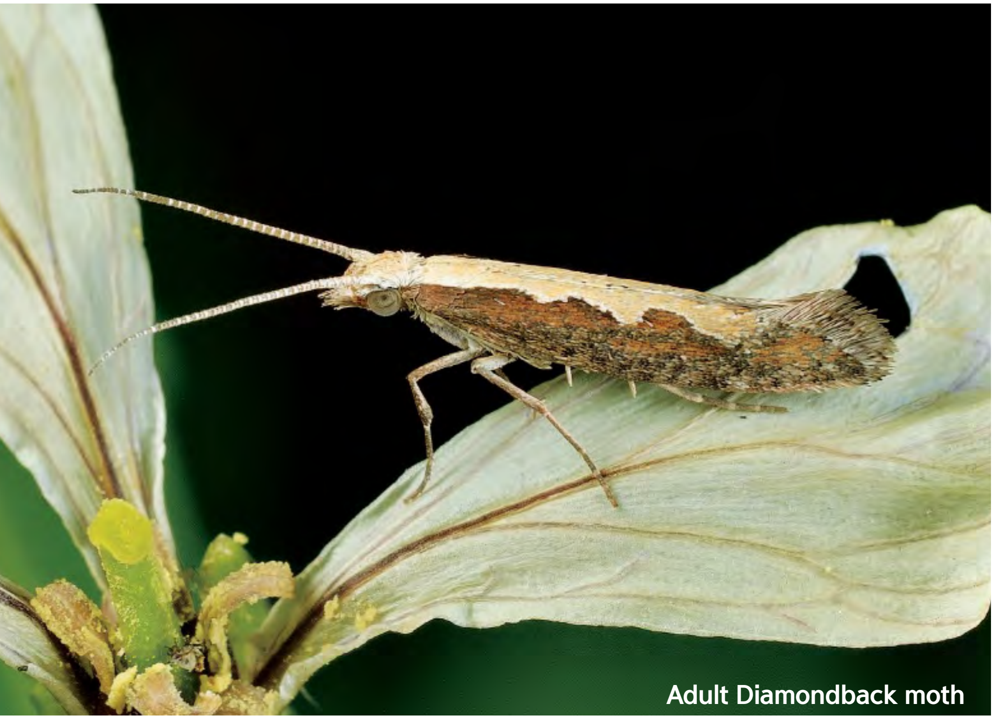
Diamondback moth pupa (cocoon)
It makes cocoon on mature leaf
and is pupae inside



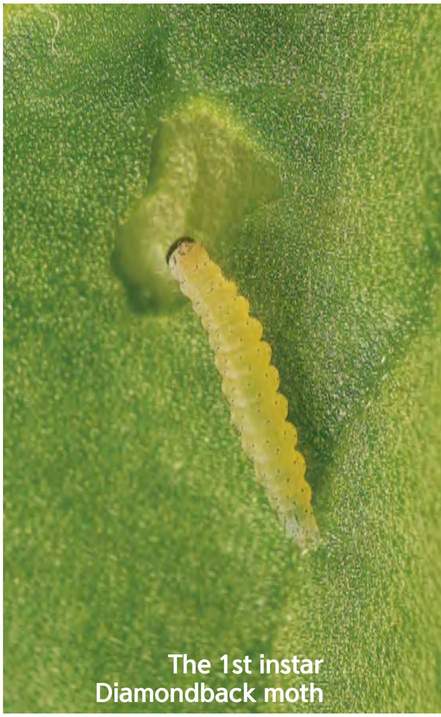
Egg of Diamondback moth



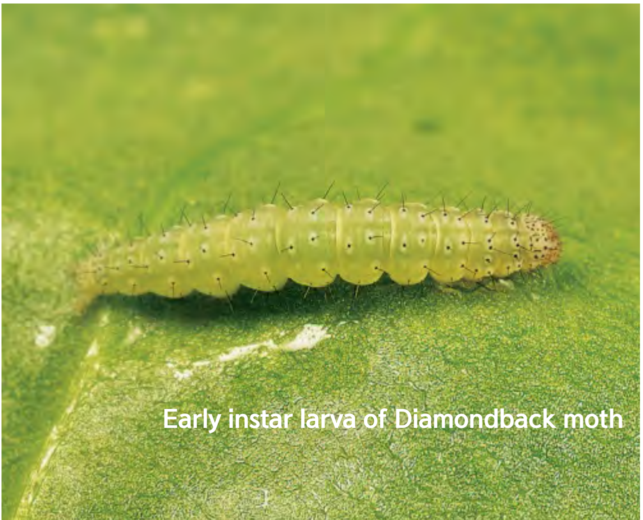
Damage on radish caused
by Diamondback moth



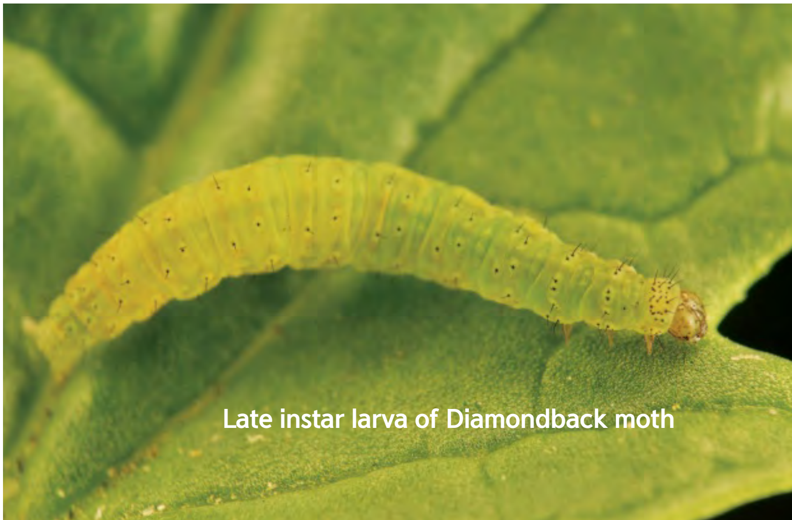
Adult Diamondback moth



The 1st instar
Diamondback moth



Early instar larva of Diamondback moth



Late instar larva of Diamondback moth

Cabbage white butterfly

Pieris rapae

Description

Cabbage white larvae are about 30mm, green, and have dense, fine hairs on the body. The pupa is grayish-yellow and has 1 seta on the head and thorax.

Adults have different shapes between males and females, but they are usually white. There are 2 black spots on the front of the fore wing and 1 on the hind wing. The length of the body is 20mm, and the length of unfolded wings is 50~60mm. Males are thinner and whiter than females. The egg is columnar, yellow, and lays on the backside of leaves.

Life cycle

There are times when the damage is significant in young cabbage, but the damage is relatively modest because it is not concentrated. They occur 4-5 times a year. It overwinters as a pupa while attached to plants and walls. It then becomes an adult in early spring and lays eggs on the leaves of wild cruciferous plants like cabbage, chinese cabbage, or radish.

Since the cabbage white continues to repeat generations in autumn, it is possible to see each insect's stages from spring to autumn. The damage is severe in spring, and outbreaks decrease in the hot summer months along with the rainy season and then increases again in the autumn season, including in drought.

The eggs are individually spawned. Adults are active during the day and are often mistaken with white butterflies. The larvae are similar to the color of cabbage leaves, so it is not easy to identify with a glance, but a larva with a lot of fine green hairs is easily identifiable.

Damage

When the larvae are young, they leave only the leaves' epidermis after eating, but the mature larvae eat leaves leaving the stems. In particular, the damage is severe on cabbage and Chinese cabbage during autumn and spring.

(National Crop Pest Management System/NCPMS)

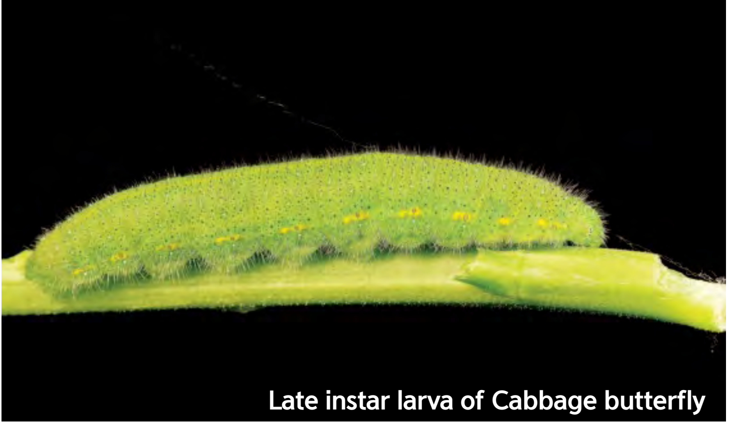
Refer to pages 25, 35~37

JADAM Natural Control Ratio

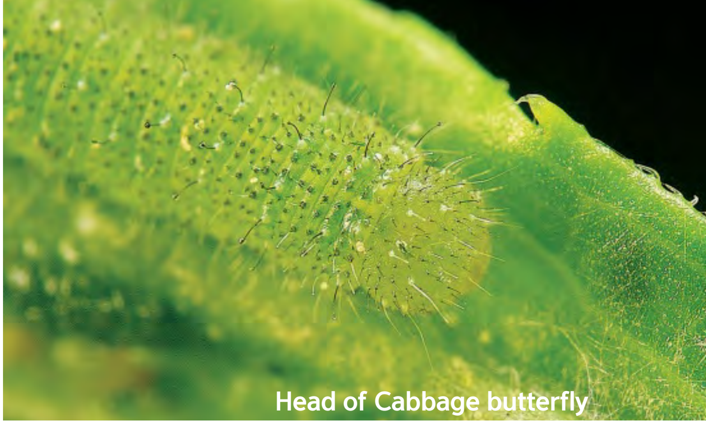
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		600ml	700ml
JHS		600ml	700ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	5days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- This pest can multiply rapidly, so if it does occur, it may be necessary to control it at intervals of one or two frames.

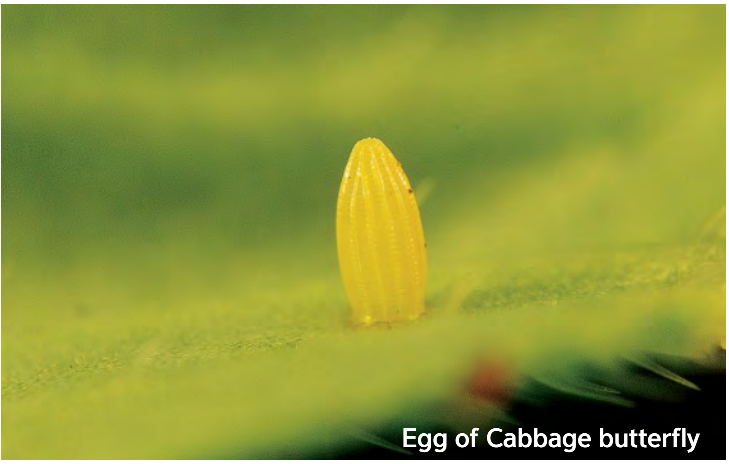
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



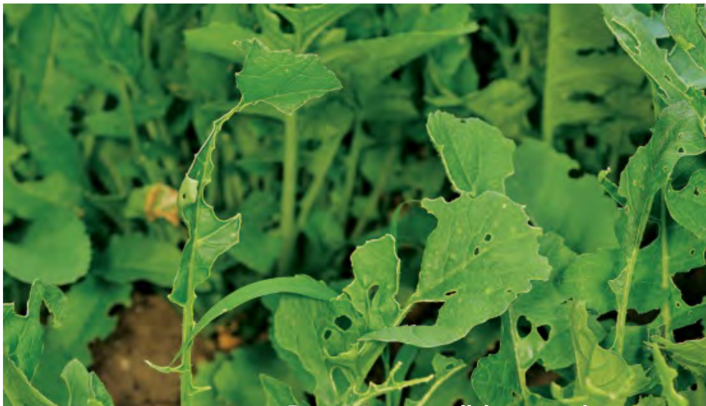
Late instar larva of Cabbage butterfly



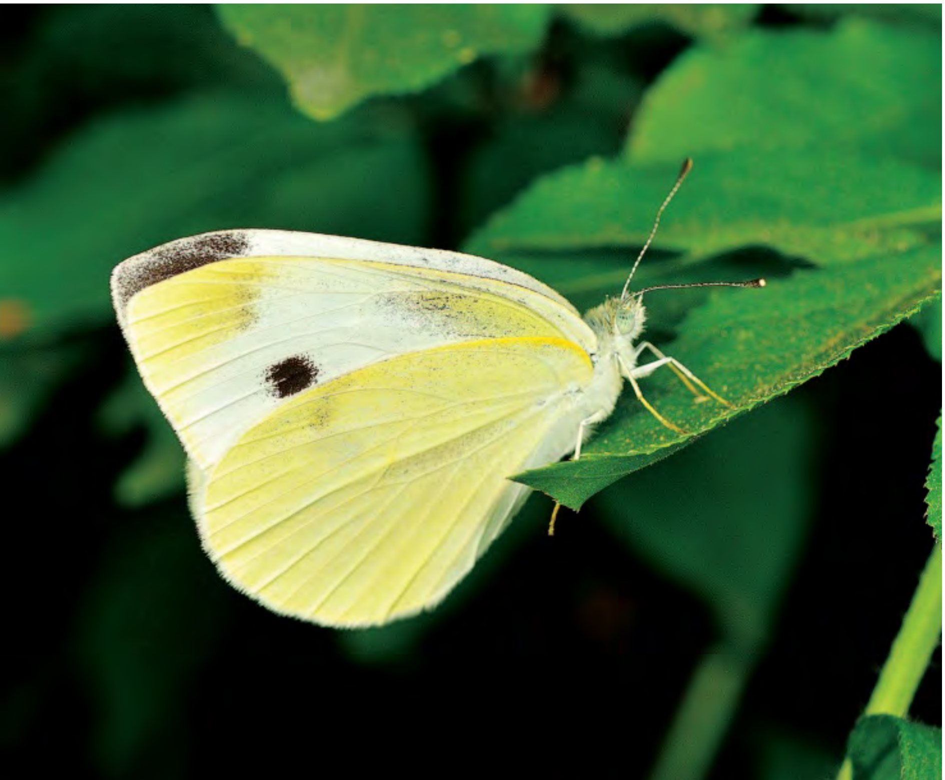
Head of Cabbage butterfly



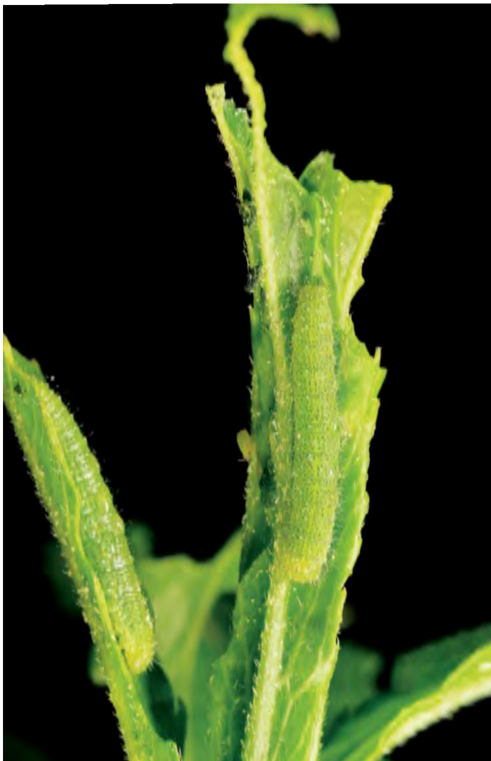
Egg of Cabbage butterfly



Damage on radish caused by Cabbage butterfly



Adult Cabbage butterfly



Early instar larva of Cabbage butterfly

Yellow peach moth

Conogethes punctiferalis

Description

Adult insects are about 15mm long, and the wingspan is 25~30mm. There are black spots on the thorax and abdomen, 20 on the fore wings, and about 10 black spots on the hind wings. When the larvae are fully grown, the length is about 2.5cm, and each body segment has black spots and long hairs. The pupa is a slightly angular long oval and is contained in a sloppy grayish-white cocoon.

Life cycle

They occur twice a year. The grown larva overwinters in a cocoon. The first adult appears in June and spawns in fruits such as peaches. The single larva eats several fruits. The larval period is about 20 days, and the pupa period is about 10 days.

The second adult insect emerges from late July to early August, mainly damaging chestnut trees and apples. Install a pheromone trap to predict the number of adult insects.

Damage

When larvae damage fruit, it discharges its red-brown excretion through the hole where the larva penetrated. It is easy to distinguis the occurrence. Young larvae cut and eat chestnut thorns, and chestnuts turn yellow in late July during the occurrence. (National Crop Pest Management System/NCPMS)

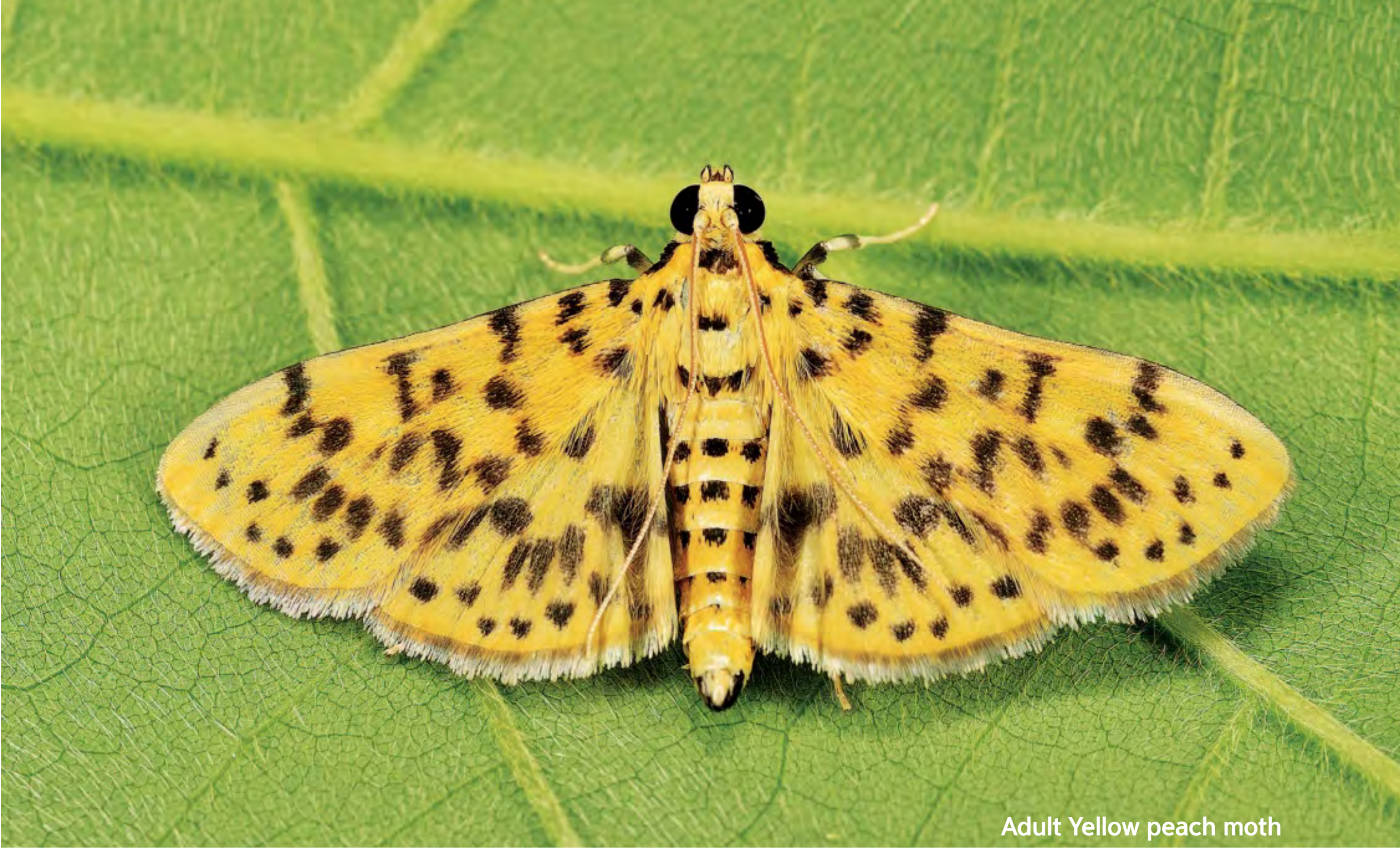
JADAM Natural Control Ratio

Refer to pages 25, 35~37

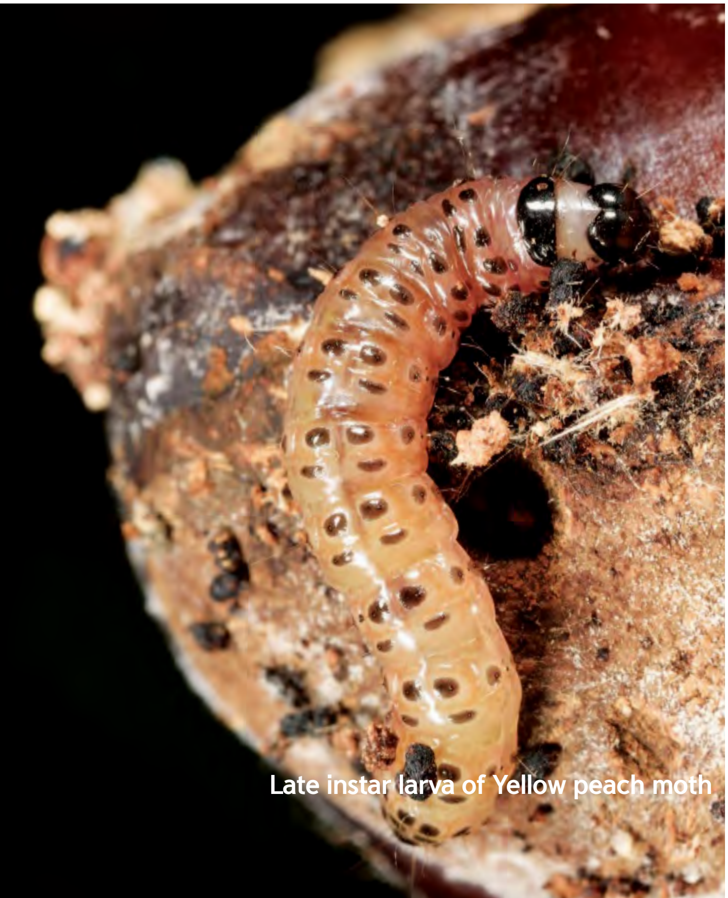
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	30minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Intensive control is carried out when pests occur.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.

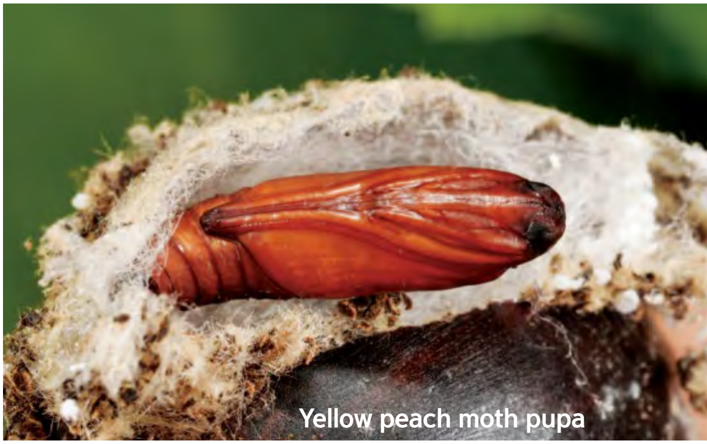
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



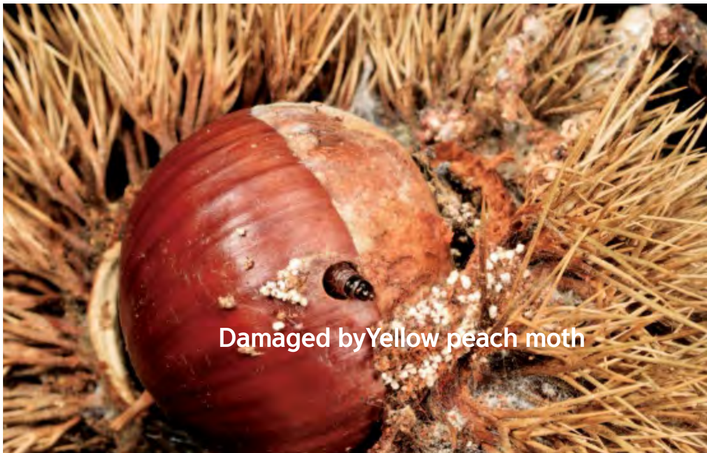
Adult Yellow peach moth



Late instar larva of Yellow peach moth



Yellow peach moth pupa



Damaged byYellow peach moth

Peach fruit moth

Carposina sasakii

Description

The body length of an adult insect is 7~8㎜, the fore wing is grayish-white, and the wingspan's length is 12~15㎜. There is a cloud-shaped blackish-brown pattern on the front edge and a glossy blackish-brown triangular pattern slightly below the center. The eggs are red, flat, and round. The larvae have a convex shape in the center of the body, yellowish-white when in cacoon, but red when it grows and escapes the cacoon. Late instar larvae are 12-15 ㎜. The pupae are contained in a fusiform cocoon and are about 8㎜ long and are pale yellow at first but gradually darken.

Life cycle

It damages Apples, peaches, plums, quinces, and jujubes, and most of them occur twice a year, but some occur once or thrice. Late instar larvae prepare a solid winter cocoon in an oblate shape at 2 to 4 cm in the ground and overwinter in it. In May-July, the larvae from the winter cocoon build a fusiform summer cocoon and become a pupa. The first-generation start to appear from early June to late August until early August, and most of the individuals escaped from the fruit before July to mid-August become a second-generation adult after building summer cocoons. Some of them build cocoons in winter to overwinter. The second-generation adult insects occur from the end of July to the beginning of September, and the optimum growth period is in mid-August in the subtropic area. Very few are 3rd generation adult insects, which occur in late August to mid-September. Therefore, most of them come out of the fruit before mid-October, fall to the ground, make winter cocoons to get ready for wintering.

Damage

The larvae enter the fruit with a needle-pricked mouth sucking it vertically and horizontally, leaving a fruit mark. The young fruit deforms because of nutrient irregularities causing poor growth. Late instar larvae make holes with a diameter of 1 to 2 mm on the fruit's surface.

(National Crop Pest Management System/NCPMS)

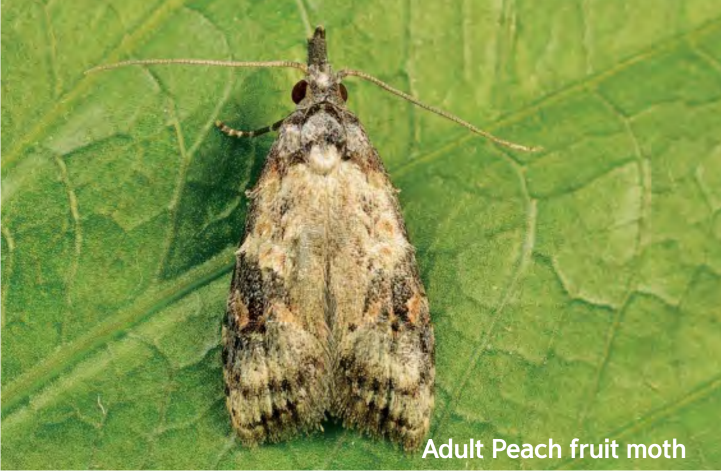
Refer to pages 25, 35~37

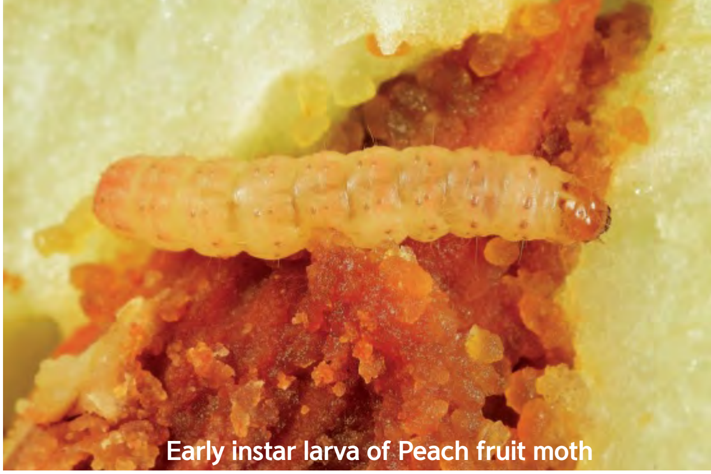
JADAM Natural Control Ratio

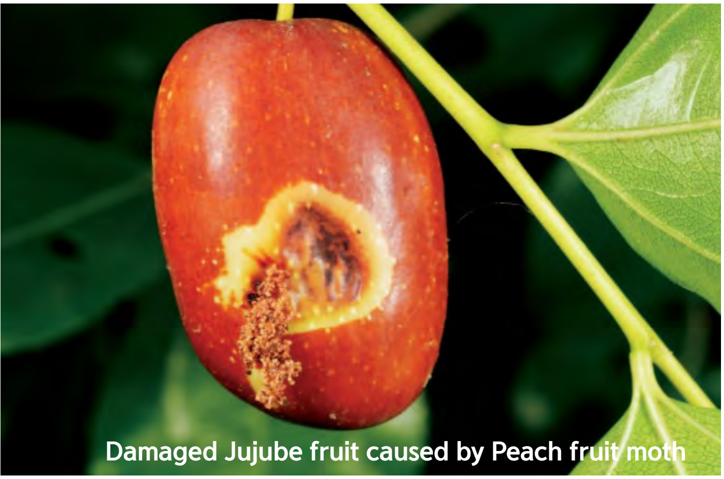
Standard (20L)	Winter Control	Occurrence Time	Emergency
JS	200ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	30minutes

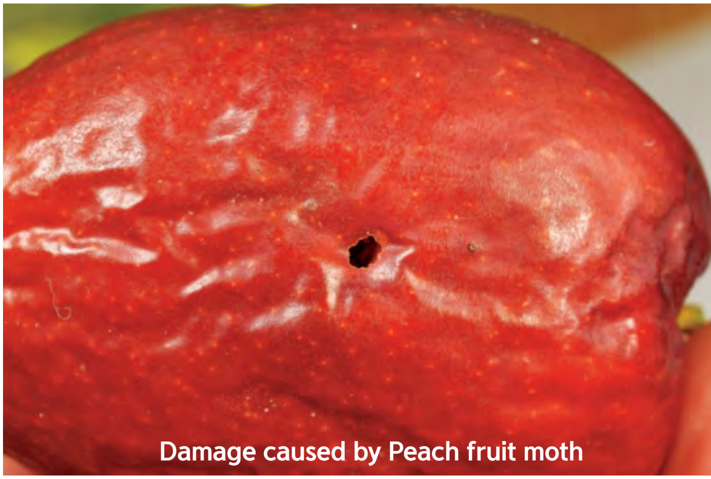
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Intensive control is carried out when pests occur.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

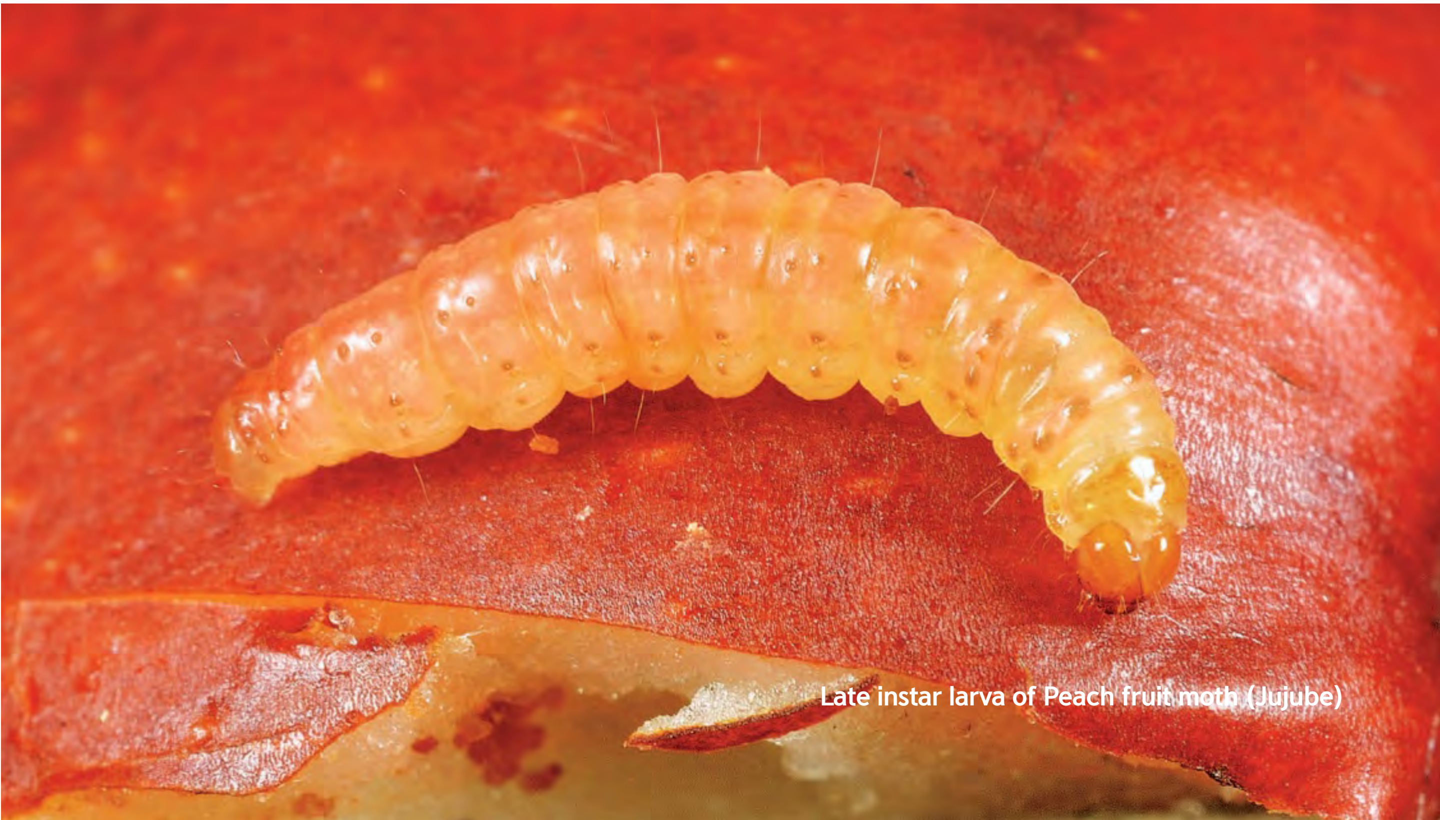
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Peach fruit moth


Early instar larva of Peach fruit moth


Damaged Jujube fruit caused by Peach fruit moth


Damage caused by Peach fruit moth


Late instar larva of Peach fruit moth (Jujube)

Apple leafminer

Phyllonorycter ringoniella

Description

The body of adult insects is generally silvery, and the fore wings are golden, and the silvery stripes in the center are clear and very small. The body length of adult worms is 2~2.5mm, the wingspan is 6mm, and the late instar larva is about 6mm. The eggs are colorless and transparent, round and flat. Young larvae do not have legs, but legs are formed from the third instar period, the body is pale yellow, and the full-grown larva is about 6㎜.

Life cycle

They occur 4-5 times a year and winters as a pupa in the fallen leaves. The first adult emerges in early April to late April. Emerged adult insects spawn on the leaves' back and tend to spawn intensively in the fast-sprouting area, near the root of the large tree near the root. Even in the same cultivar, a lot of spawning occurs on the leaves of a fruit branch with a fast-growing point. The first generation eggs hatch after 10-14 days and enter into the leaves just below the exuvia (molt). Young larvae absorb the leaves' sap and palisade tissue after the third instar period. It becomes a pupa in a hole, and it emerges from exuvia (molt)

The second-generation adult insects are in early mid-June, the third generation is in late July, and the fourth generation is in August. Some fifth-generation adults appear in September, but after the third generation, there are many cases of overlapping generations. There is a lot of damage to the mature leaves inside or below the crown until the third generation. However, after the fourth generation, it tends to be more parasitic on the second-grown shoots or young leaves.

Damage

The hatched larvae infiltrate the leaf and suck the leaf's sap. If multiple leaves are damaged and deformed, the leaves may fall early.

(National Crop Pest Management System/NCPMS)

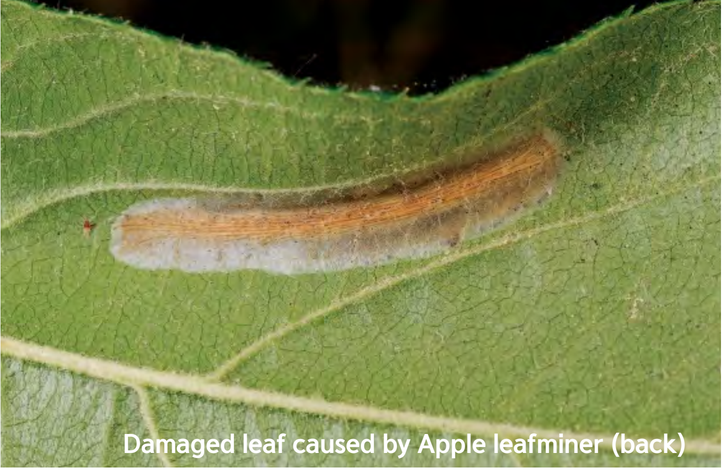
Refer to pages 25, 35~37

JADAM Natural Control Ratio

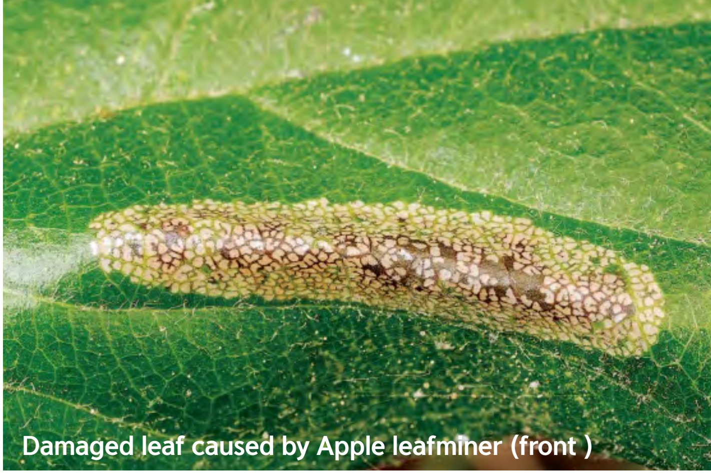
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS		500ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	Visible effect	30minutes

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

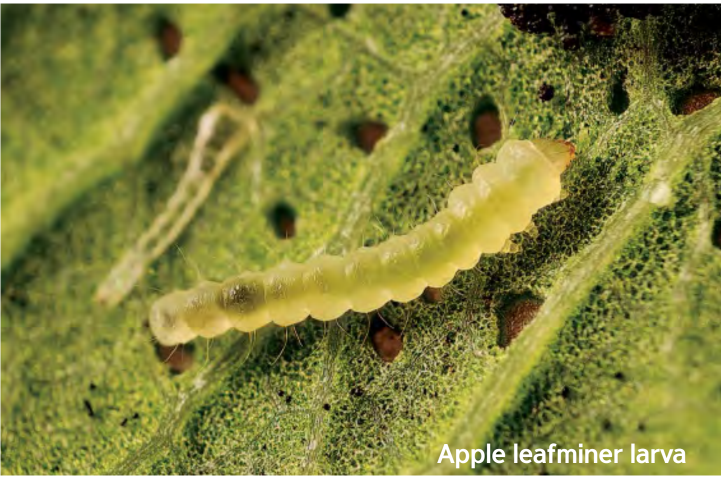
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



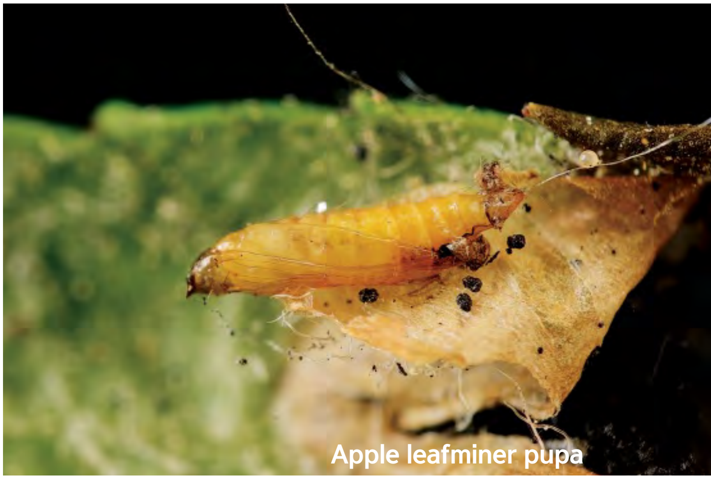
Damaged leaf caused by Apple leafminer (back)



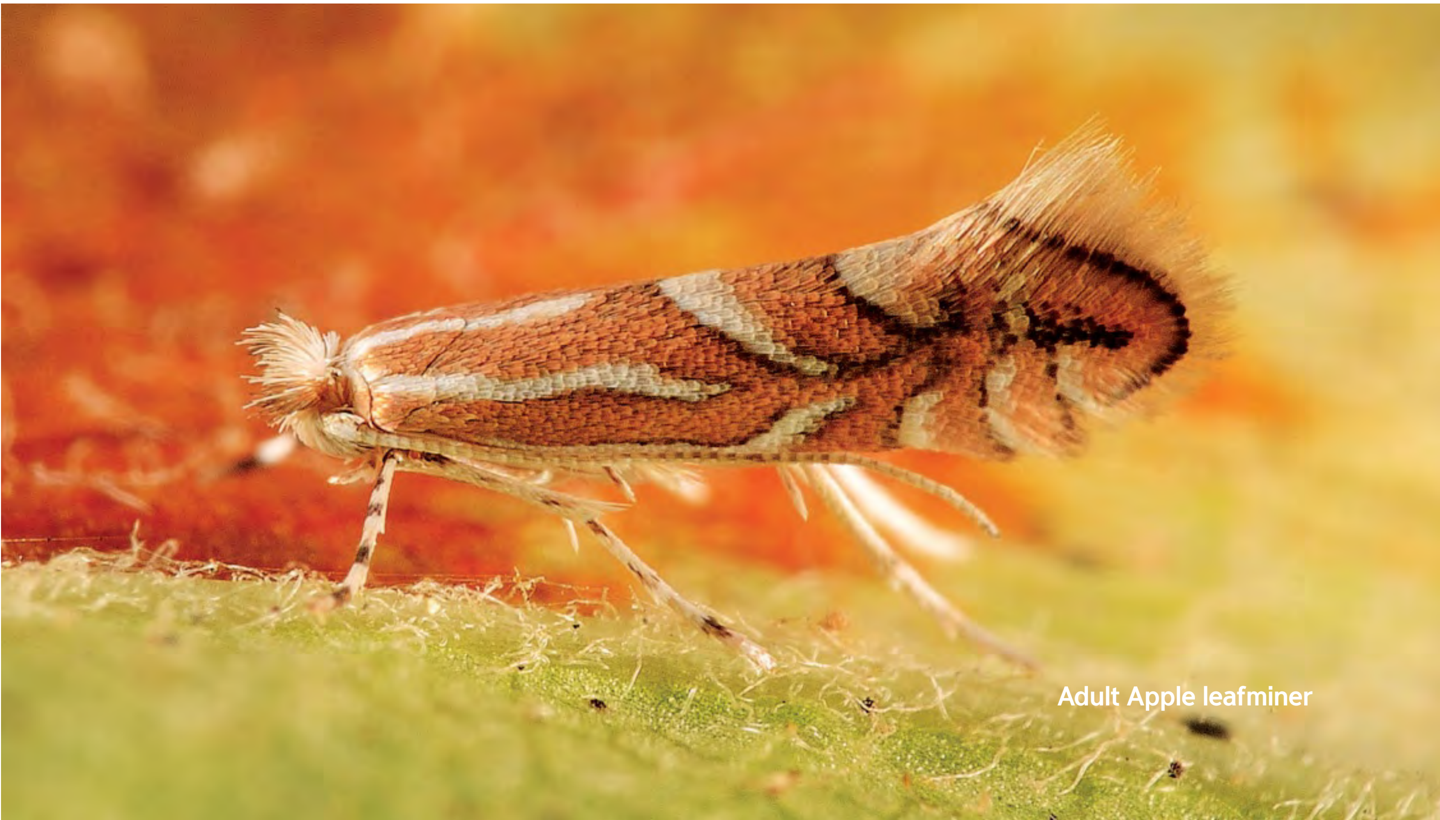
Damaged leaf caused by Apple leafminer (front)



Apple leafminer larva



Apple leafminer pupa



Adult Apple leafminer

Common apple leafroller moth

Hoshinoa longicellana

Description

The wingspan is 19-24mm for males and 23-34mm for females. Males are characterized by a bent front edge and slightly rounded wingtips. This genus and species' characteristic is that the solid thread of the male's fore wing is exceptionally long.

Life cycle

It is a major pest on apples and occurs three times a year. The young larva overwinters in the bark or fallen leaves. It harms the leaves of broad-leafed trees such as apple, pear, and oak trees. Adults are phototaxis and spawn piles of eggs on the edge of leaves. In apple trees, it is the second most common species. (Doosan Encyclopedia)

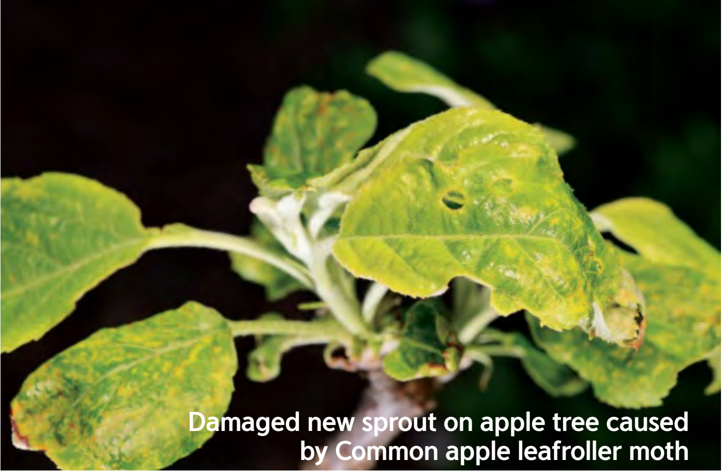
JADAM Natural Control Ratio

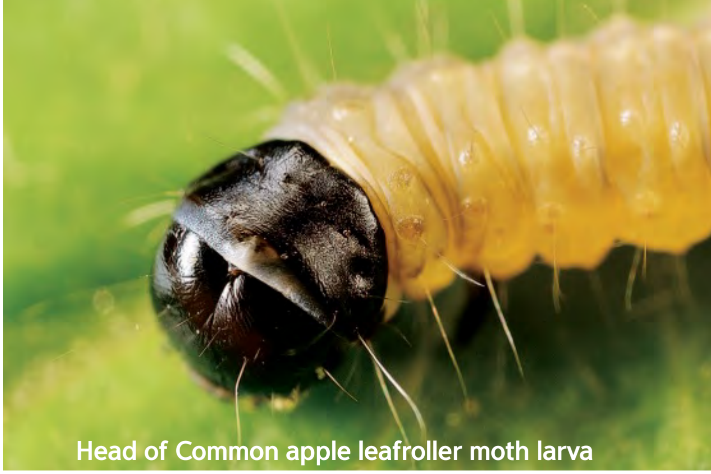
Refer to pages 25, 35~37

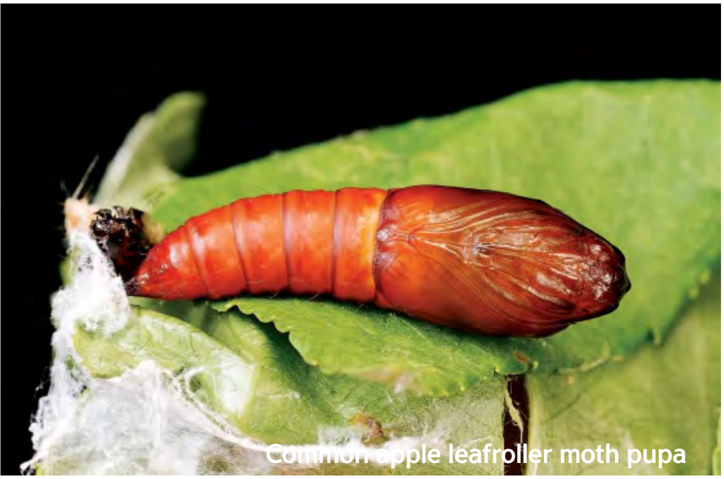
Standard (20L)	**Winter Control**	**Infestation**	**Emergency**
JS	200ml		
JWA	400ml	300ml	500ml
JHS		400ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	30minutes

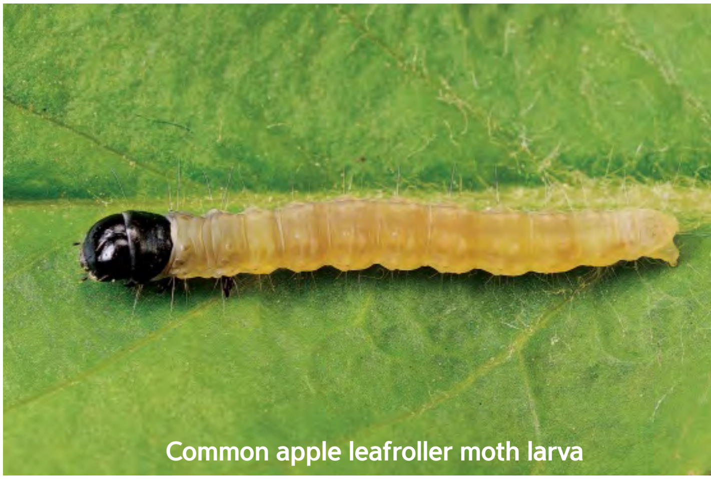
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

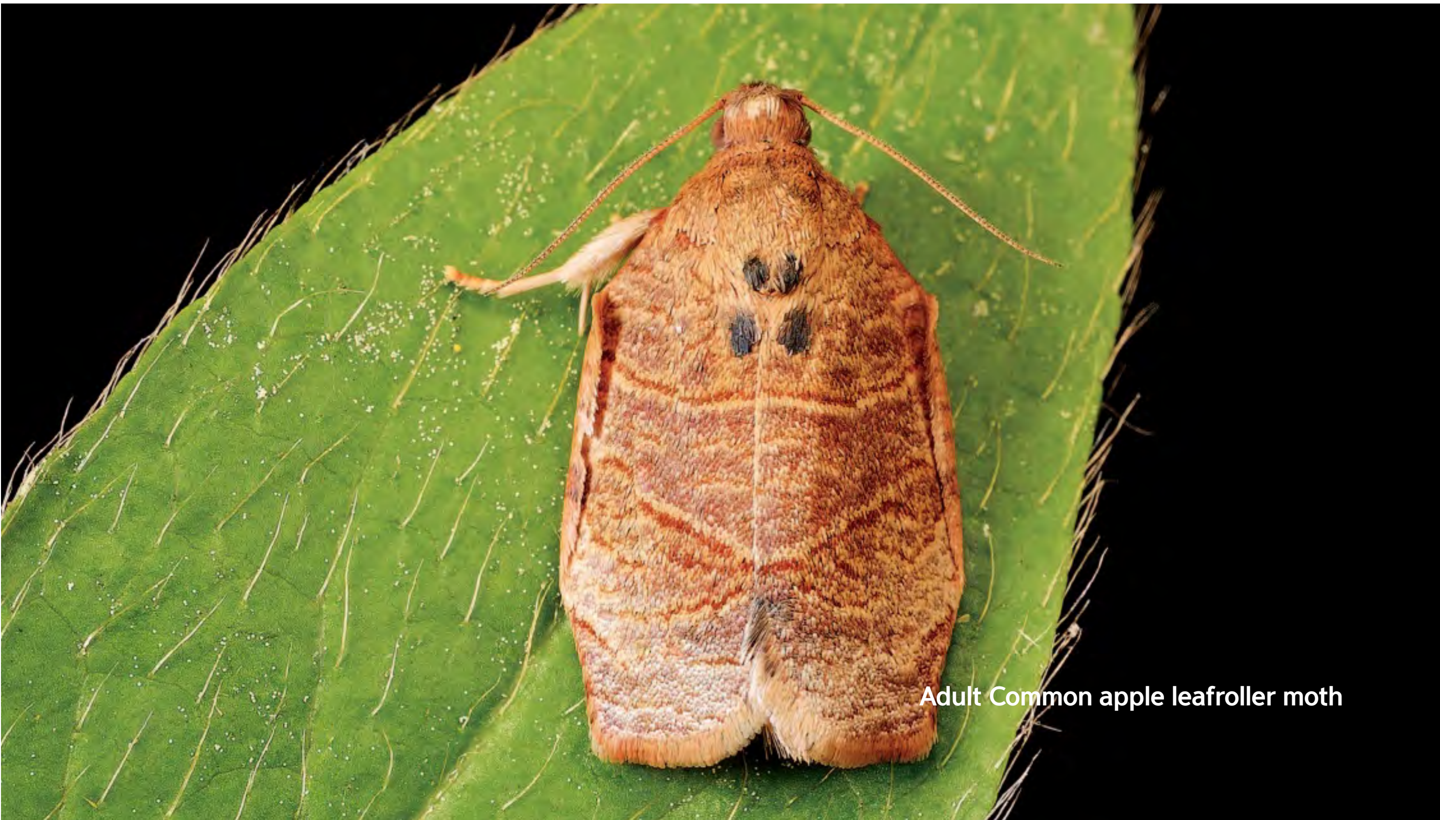
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Damaged new sprout on apple tree caused by Common apple leafroller moth


Head of Common apple leafroller moth larva


Common apple leafroller moth pupa


Common apple leafroller moth larva


Adult Common apple leafroller moth

Summer fruit tortrix

Adoxophyes orana

Description

Adult insects are 7~9mm long, orange-yellow circular moths, with a wingspan of 18~20mm. There are two parallel lines in the center of the fore wing and are diagonal. Eggs are yellow, and about 100 eggs spawn in the shape of meat scales. The larva is about 17㎜ long, and its body is yellow-green, with blackish-brown spots on its eyes and cheeks. The pupa is uniaxial, yellowish-brown, and the length is around 10㎜.

Life cycle

They occur 3-4 times a year and winter as a larva. The young caterpillars overwinter in a tree's bark gap and eat new shoots when the buds begin to bloom. When the leaf blooms, it rolls the leaf vertically to eat from inside. Although the insect is tiny, its appetite is strong, so when it damages the fruit, the fruit's surface is shallowly crushed and degrades the fruit's value. The first generation adult insects appear from mid-May to early June, the second adult insects appear from late June to mid-July, the third adult insects appear from early August to late August, and the fourth Adult insects appear from late September to mid-October, but their population density is generally low in the fourth occurrence.

(National Crop Pest Management System/NCPMS)

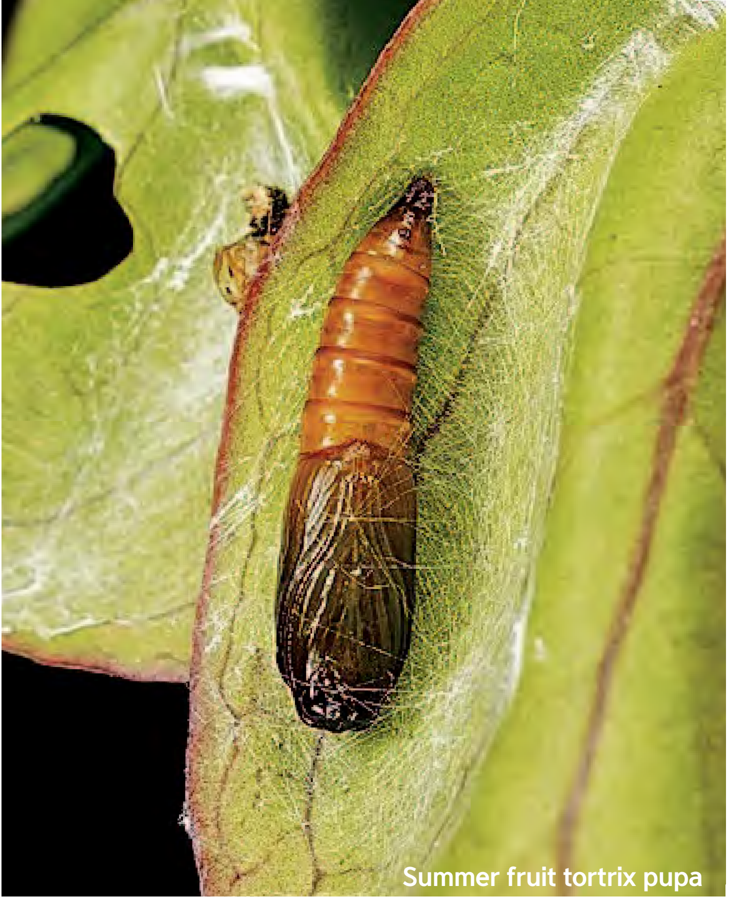
Refer to pages 25, 35~37

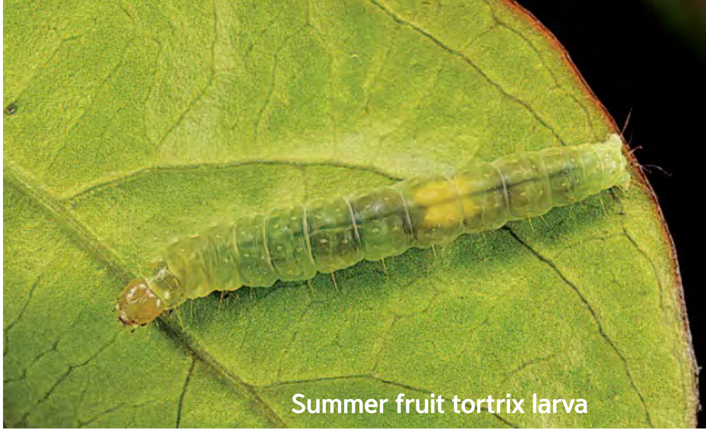
JADAM Natural Control Ratio

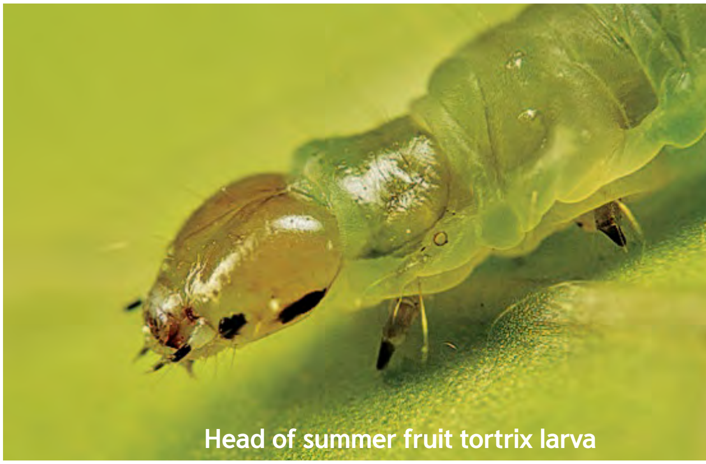
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	400ml	500ml
JHS		400ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g	40g	60g
Control interval	7days	**Visible effect**	30minutes

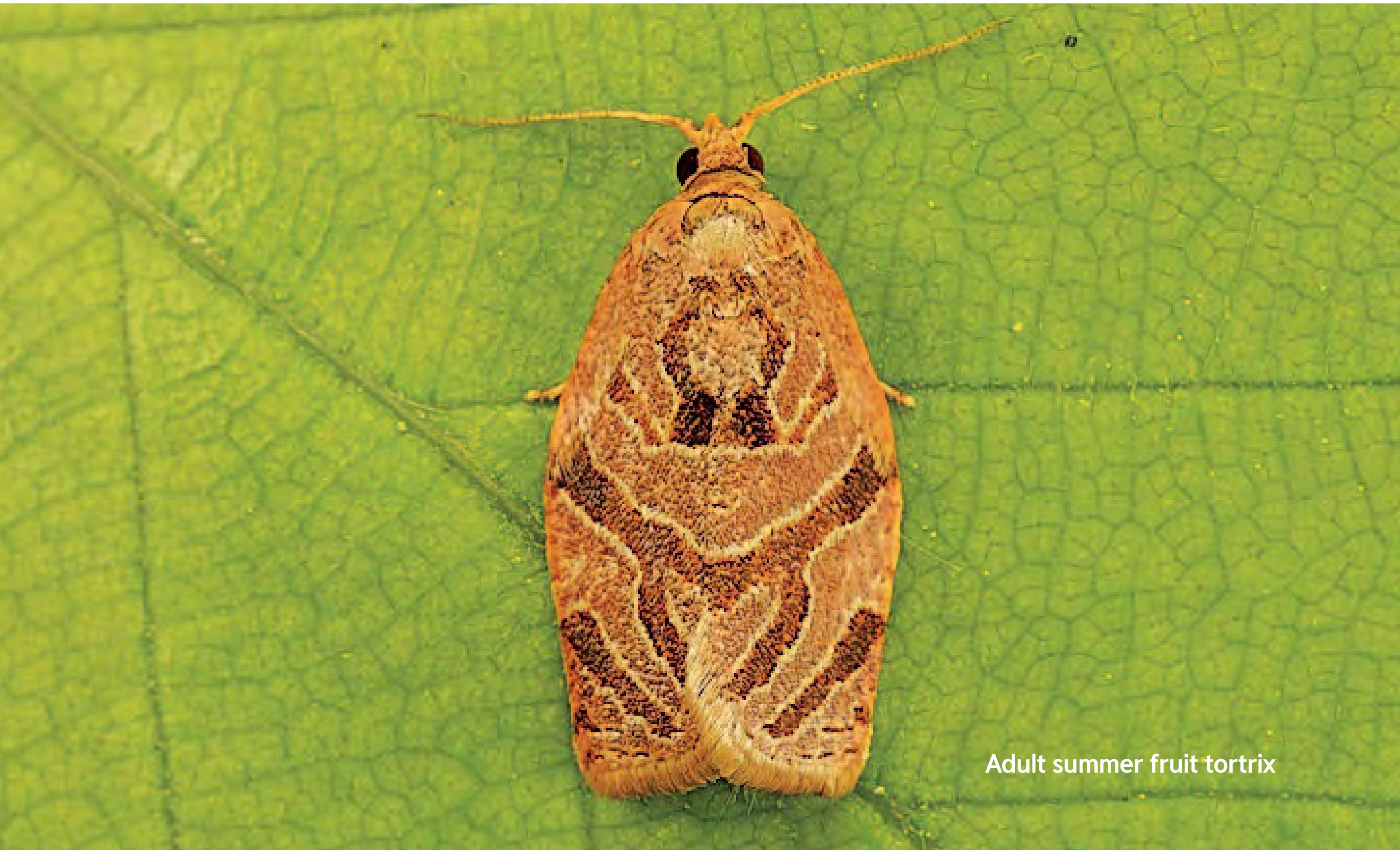
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Summer fruit tortrix pupa


Summer fruit tortrix larva


Head of summer fruit tortrix larva


Adult summer fruit tortrix

Udonomeiga vicinalis

Description

The head of the larva is yellow, and the body is white-green and glossy. There are black dots at the edges of the chest and abdomen, and there are two white lines along both sides of the middle upper surface. It builds its own house with woven thread between the leaf's back and the plant's stem and lives in a group. The adult moth has water-like wave patterns on its wing.

Life cycle

It spawns eggs in masses on the host plant's surface, and hatched larvae live as a group to expand damage while its thread is attached to the leaf. Late instar larvae turn red and become pupa on the leaf. Some emerge within 23 days, and some in spring. Until now, identified host plants are Aralia elata (Japanese angelica tree) and Umbelliferae.

Damage

The windbreak leaves are weaved with spider webs, the leaves are gnawed from the inside, and excrement is secreted to the surroundings. As the larvae grow gradually, the damaged area expands, and only the stem remains in the damaged area.

(National Crop Pest Management System/NCPMS)

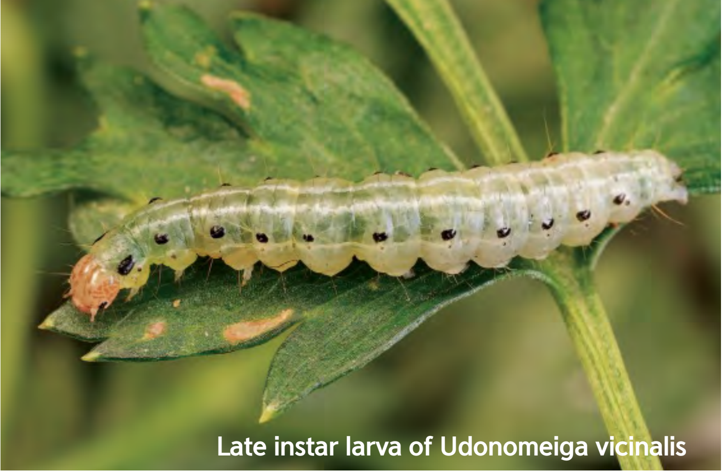
Refer to pages 25, 35~37

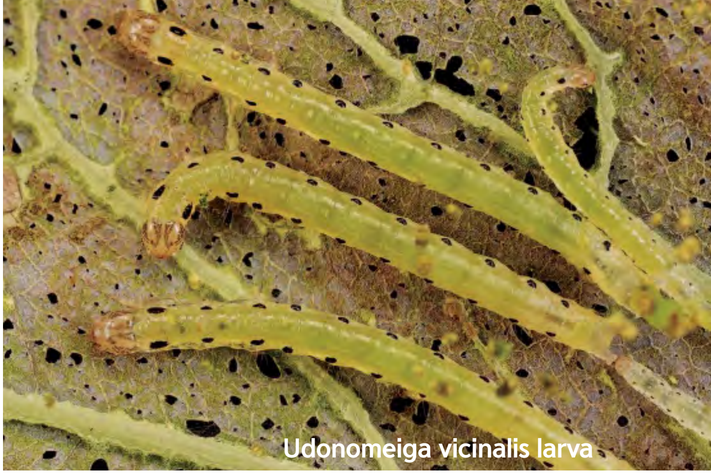
JADAM Natural Control Ratio

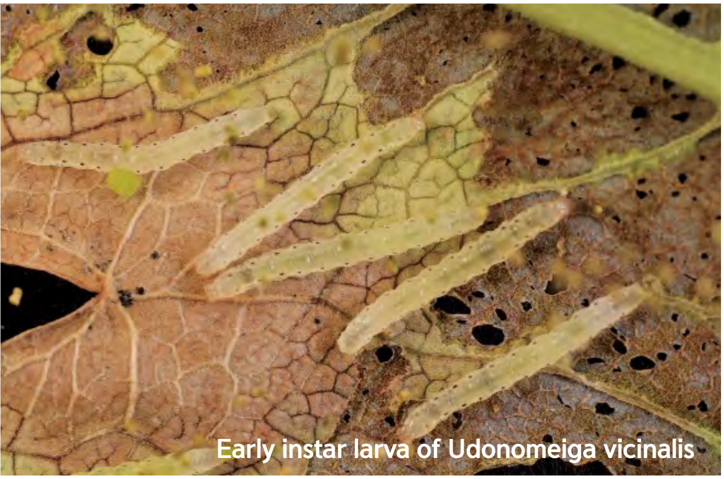
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	Visible effect	10 minutes

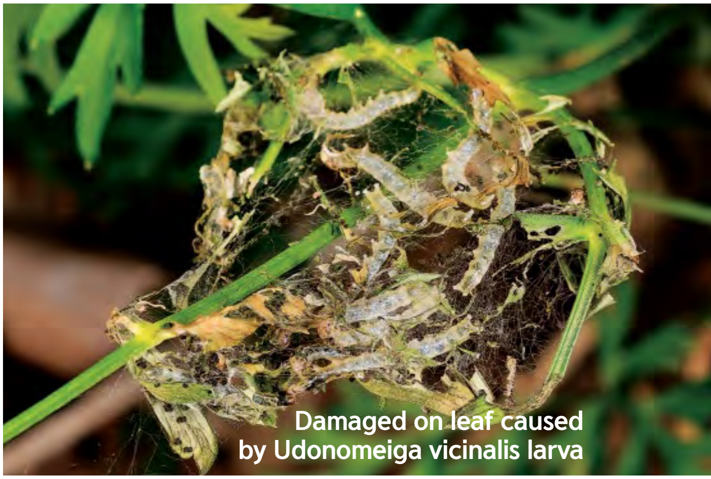
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

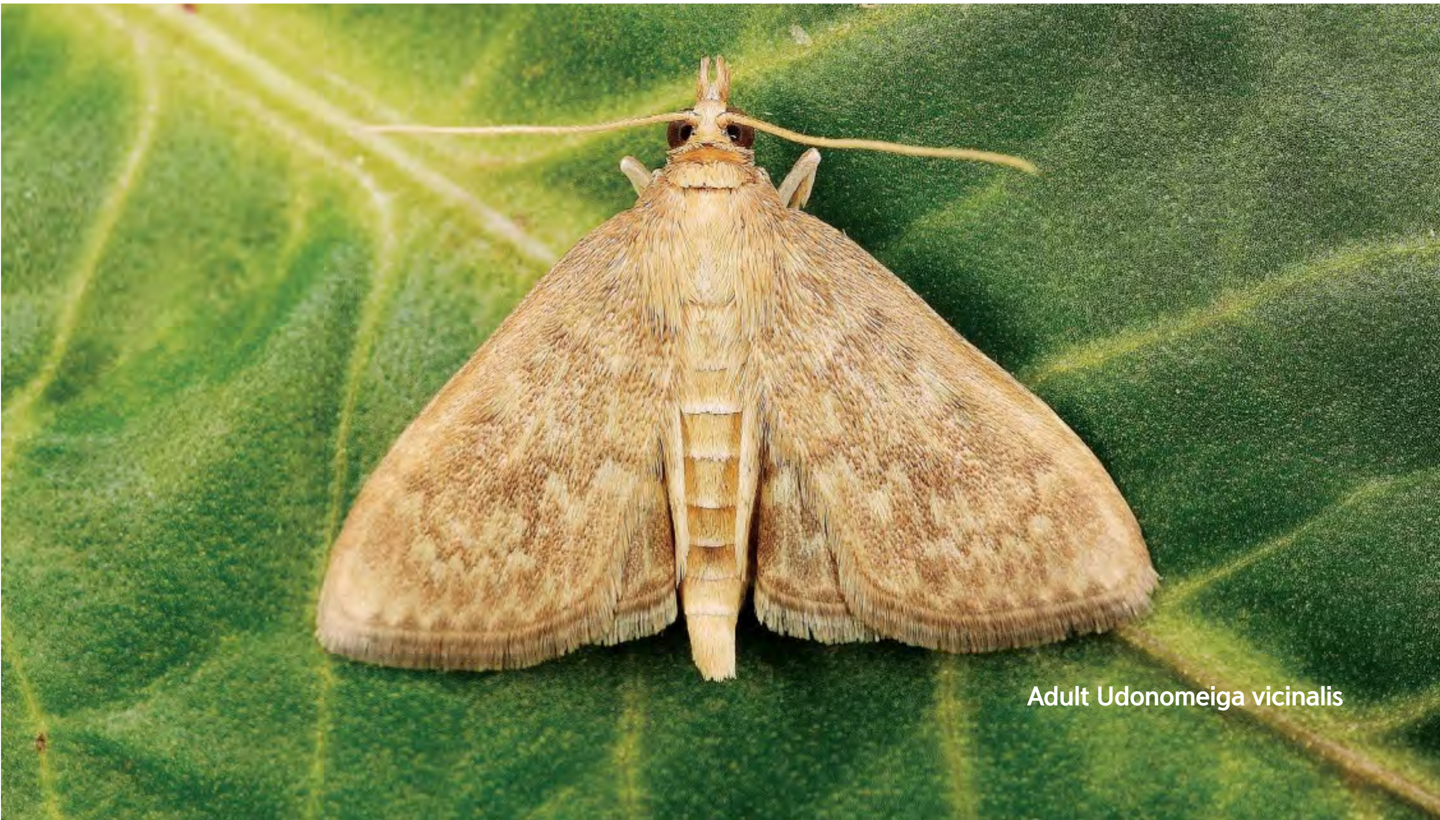
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Late instar larva of Udonomeiga vicinalis


Udonomeiga vicinalis larva


Early instar larva of Udonomeiga vicinalis


Damaged on leaf caused
by Udonomeiga vicinalis larva


Adult Udonomeiga vicinalis

Cotton bollworm

Helicoverpa armigera

Description

The length of the wing of an adult insect is around 35mm, the antennae are whip-shaped, and the outer edge of the hind wing is black. Adult insects are similar to oriental tobacco moths (Helicoverpa assulta), but oriental tobacco moths have distinct renal radish and ring patterns on their fore wings, whereas cotton bollworm does not have a ring pattern or are faint, and are distinguished by seven milky white patterns between brown horizontal lines. The larva has white hair around the head, and the fourth segment and the back of the head have a dark color.

Life cycle

2 to 3 generations occur per year. It emerges during May and June from the ground after the pupa state causing damage until October. It spawns 1 egg per leaf, but sometimes 5-10 eggs are spawned, and around 500 eggs are spawned in total. The period from spawning to hatching takes about 3 to 4 days at room temperature, and from eggs to emergence of pupa takes about 17 to 20 days, the larval period is about 19 to 26 days at 25°C, and the mature larvae pupate 2 to 10 cm below ground. The lifespan of an adult moth is 10-12 days. Install a pheromone trap to detect occurrence by observing the excrement on damaged plants.

Damage

Polyphagous insects widely harm, including but not limited to vegetables, fruits, flowers, Tobacco, potato, cotton, beans, green beans, peanuts, tomatoes. During this occurrence, petals and new leaves are injured. In citrus gardens, they gnaw the leaves of new shoots, mainly from May to September.
(National Crop Pest Management System/NCPMS)

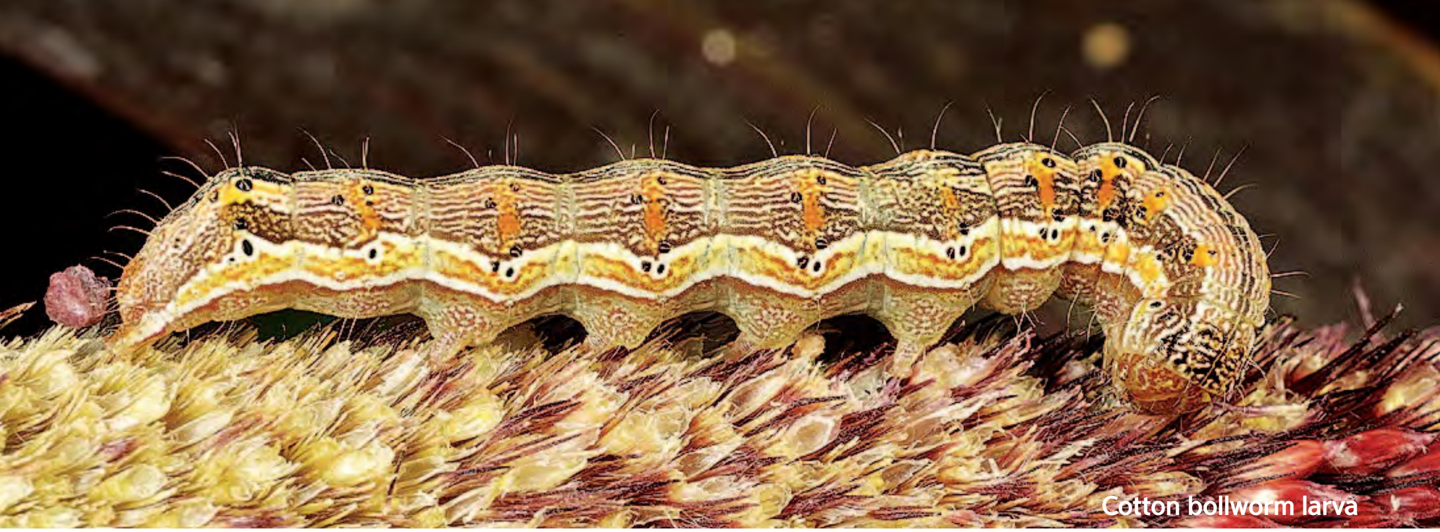
JADAM Natural Control Ratio

Refer to pages 25, 35~37

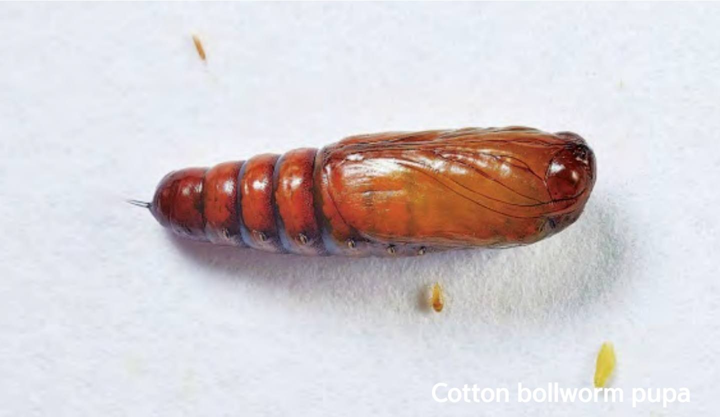
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			60g
Fine soil			40g
Control interval	7days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

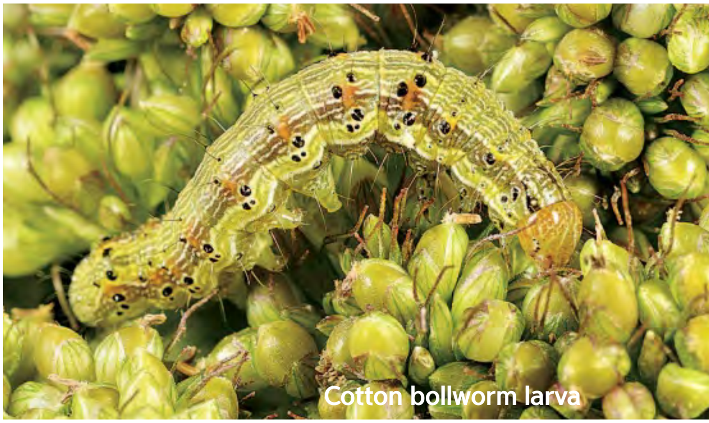
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



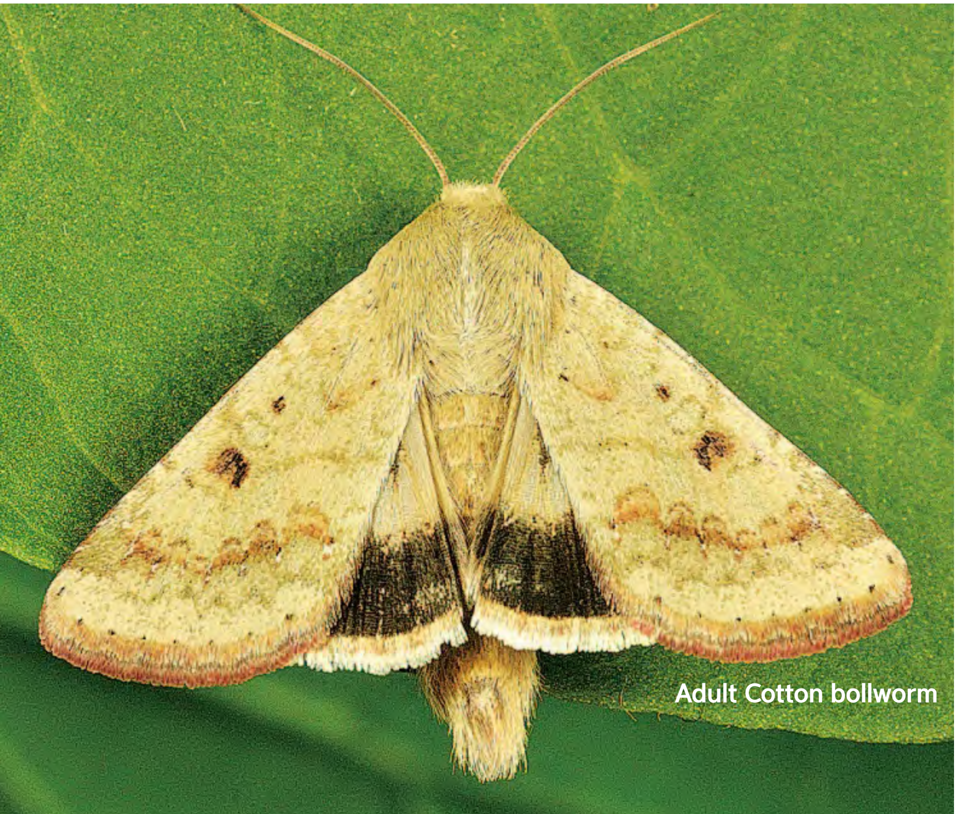
Cotton bollworm larva



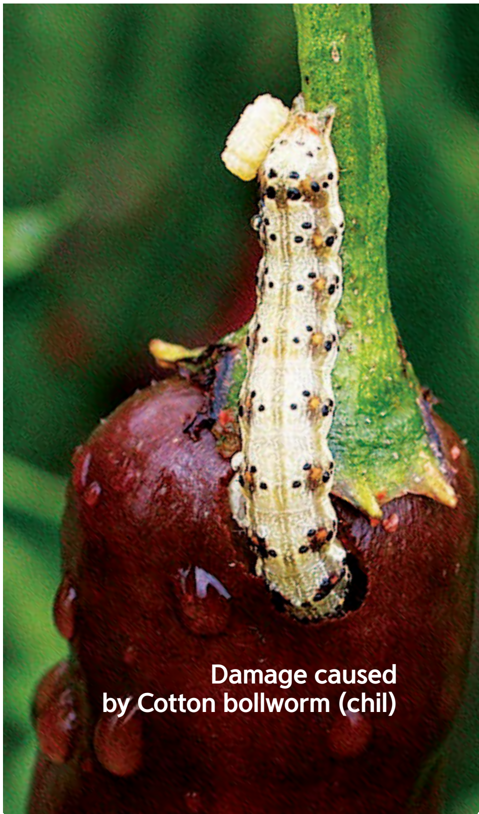
Cotton bollworm pupa



Cotton bollworm larva



Adult Cotton bollworm



Damage caused
by Cotton bollworm (chil)

Asian corn borer

Ostrinia furnacalis

Description

The body length is 13~15mm, and the wingspan is 25~35mm. The front wing has a wave pattern, the rear wing has a row of yellow bands, the female is light yellow to reddish-brown, and the male is dark yellow to dark reddish-brown. The larvae are 20~25mm in body length, almost light yellow to dark brown, the head and prothorax skin plates are dark brown, and there are many light brown fleshy protrusions on each joint.

Life cycle

They occur 2-3 times a year and winter as a late instar larva. The first adult insect emerges from late May to mid-June and lays eggs in the rice family plant. Usually, they lay eggs on young plants with a length of 20 to 30 cm, and the second adult insect from mid-July to mid-July. It flies in early May and lays eggs on the back of the leaves of corn and adlay. The third adult insects emerge from mid-August to early September and occur 10 days later in cold regions.

Damage

The first larva gnaws leaves or stems close to the ground. The leaf damage symptom is that several holes are made horizontally side by side at the leaf's tip. Damage symptoms on a stem are easily identifiable with the holes created by the pest because the larva's excrement is discharged from the hole on a leaf. Especially in the sorghum stem, the damaged part becomes red, so it is easy to distinguish. If damage is severe the plant will dry and die.

Although it is an omnivorous pest, it mainly damages corn. The young larvae in the first inflorescence live in a group eating the backside of the leaf at the initial stage, and after the second to third instar period, they dig into the weeds or stems and damage from the inside.

(National Crop Pest Management System/NCPMS)

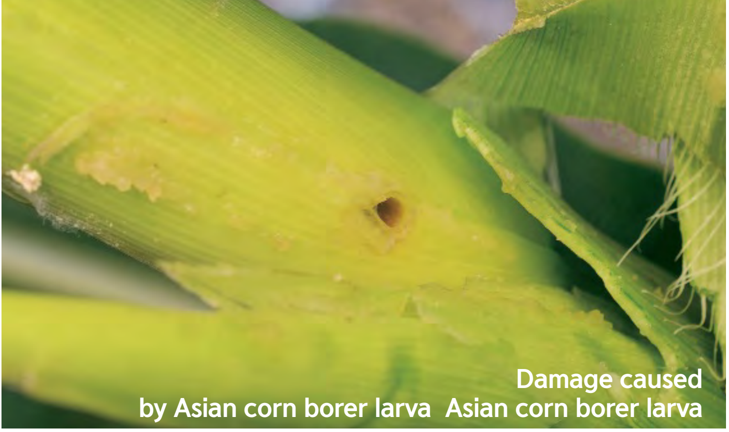
JADAM Natural Control Ratio

Refer to pages 25, 35~37

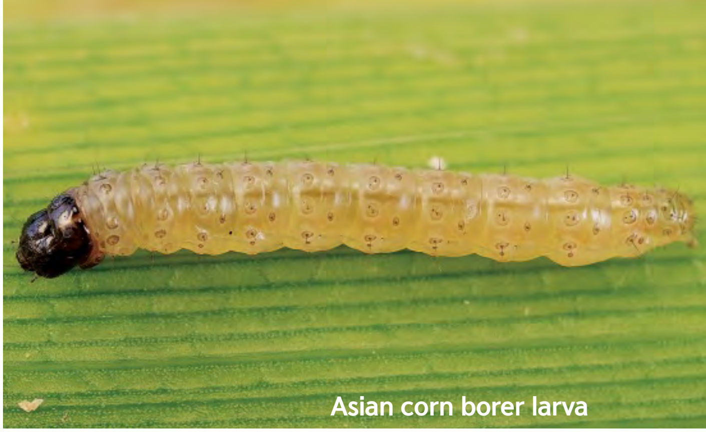
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	Visible effect	10 minutes

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

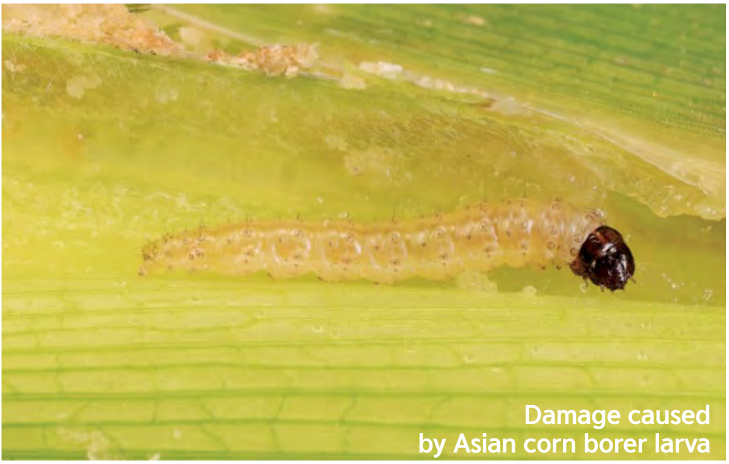
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



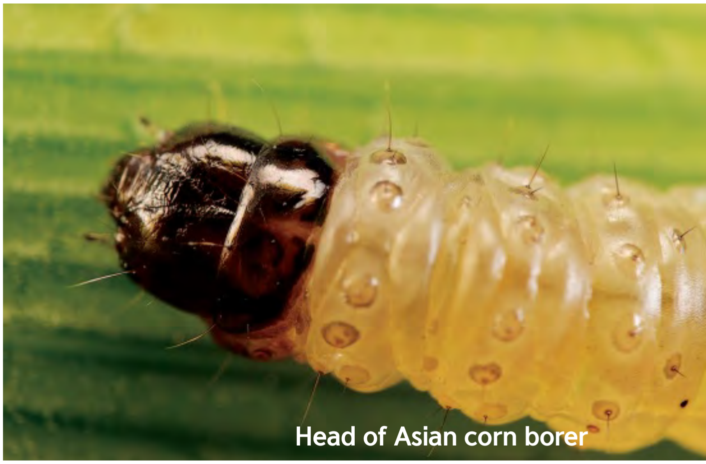
Damage caused
by Asian corn borer larva Asian corn borer larva



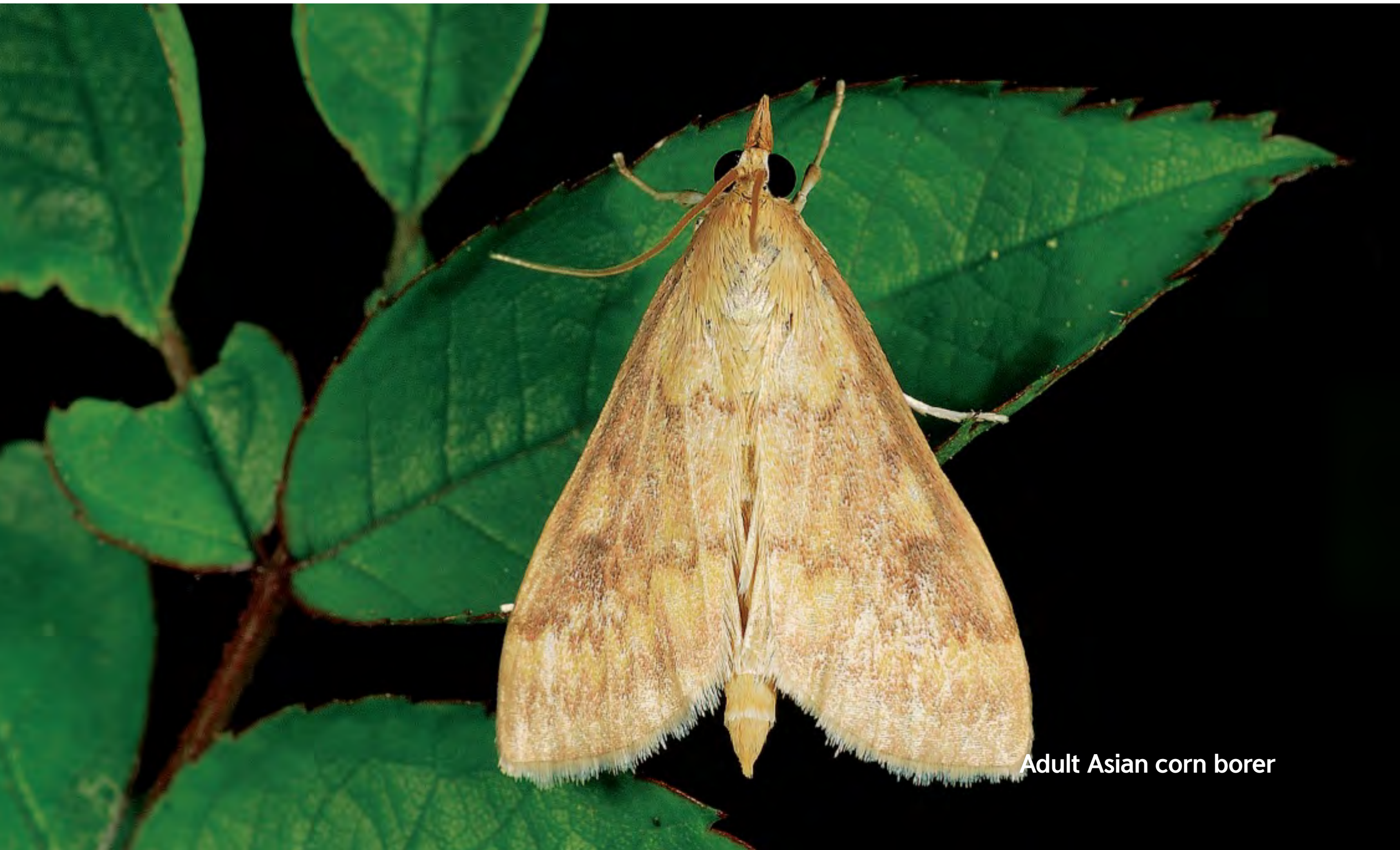
Asian corn borer larva



Damage caused
by Asian corn borer larva



Head of Asian corn borer



Adult Asian corn borer

Bean tussock moth

Cifuna locuples

Description

A single wing length is 34-42mm for males and 48-53mm for females. The male and female antennae have a comb shape, but the male's comb is shorter than that of the female. The forewing is light brown, and the pattern is dark brown. The base is slightly dark brown, and the inner and outer transverse lines are faintly visible. The transverse vein has a long oval dark brown pattern, but it is not clear. The hind wings have a slightly light yellowish-brown color, and the lateral line on the back is clear from the front edge to the center of the wing, but after that, it fades.

Life cycle

Adult insects appear from June to September, and the larvae eat fruit trees such as peach and apple trees and leaves of oak and wisteria, and they also harm beans. It is widely distributed in Korea, Japan, China, Taiwan, and northern India. hey occur one generation. (Doosan Encyclopedia)

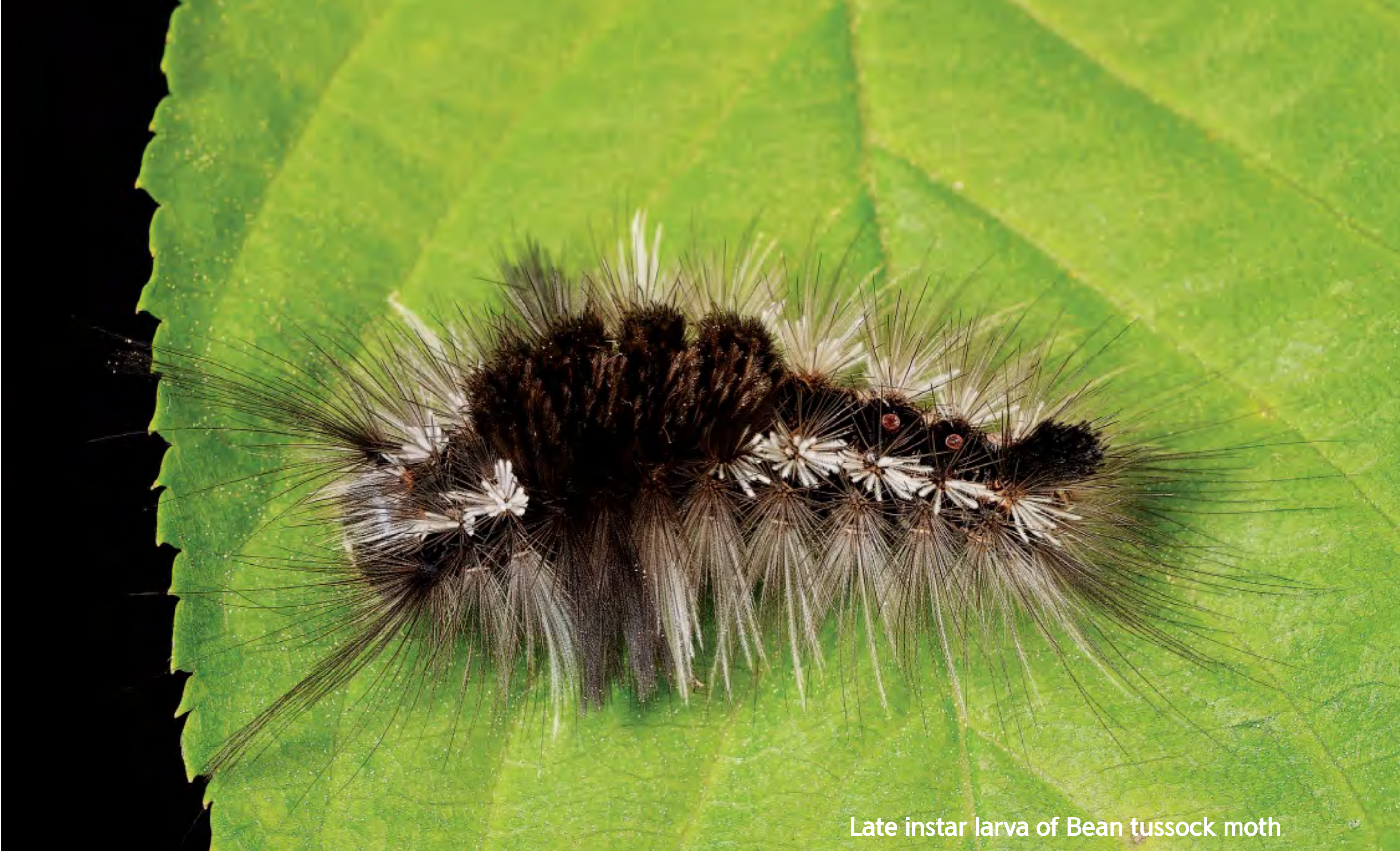
Refer to pages 25, 35~37

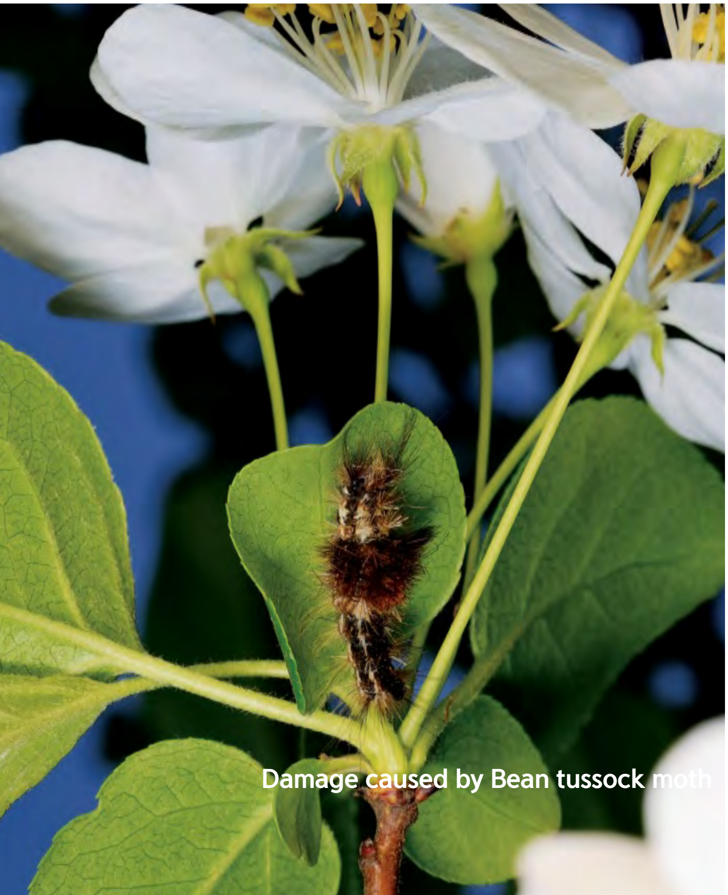
JADAM Natural Control Ratio

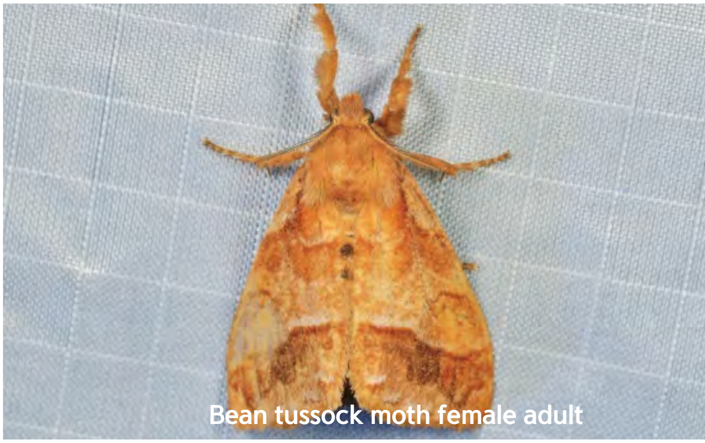
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	10 minutes

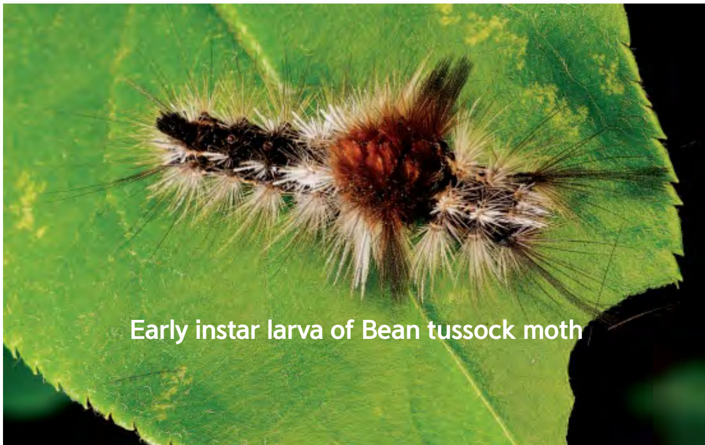
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- This pest has a lot of silver hair, so move the spray from side to side to get it wet enough.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Late instar larva of Bean tussock moth


Damage caused by Bean tussock moth


Bean tussock moth female adult


Early instar larva of Bean tussock moth

Bean pod borer

Maruca vitrata

Description

Adults have a wingspan of 25-27mm. The head of an adult insect is dark brown, and the base of the antennae is white. The face is broad but slightly protruding. The lower lip hair is almost extended anteriorly, the lower part is white, the other part is dark brown, and the 3rd segment is slightly pointed. The base color of the forewing is dark yellowish-brown, black scales are scattered, and there is a large white pattern in the center.

Life cycle

The Western Bean pod borer occurs once a year, but there is little information about it. The emergence period of adult insects is from late April to early November, and is particularly well attracted to infant plants, and mainly appears between 8:00 and 11:00 at night. Adults mainly spawn during bud formation, and larvae elapse from the first to fifth instar period, the most incidence during the early flowering period of reproductive growth, and then the density decreases. In the flowering period, it mainly attacks the pods of the flower and stems.

At 25°C, the egg period is 3 days, the larval period is 14 days, the adult insect period is 12 to 16 days, and a female spawns about 200 eggs.

Damage

The host plant is mainly legumes such as beans, red beans, eastern and mung beans, and some lily family, mallow family, and mimosa plants. Caterpillars harm flower buds, flowers, pods, and stems. If not controlled, the damage to seeds amounts to 20-60%. The larvae move to several flowers and cause damage, and until becoming an adult, one larva damages 4-6 flowers.

(National Crop Pest Management System/NCPMS)

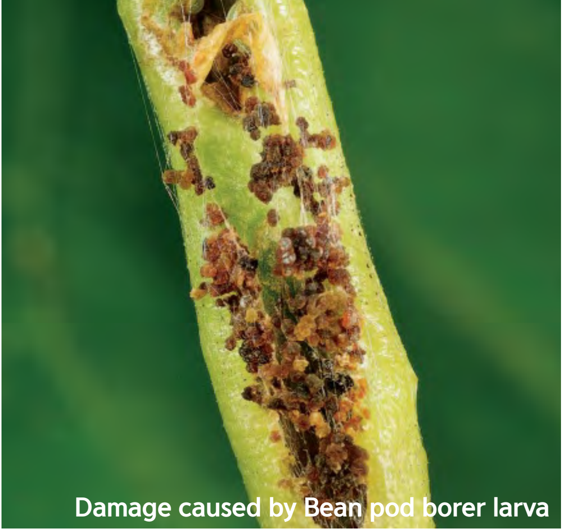
Refer to pages 25, 35~37

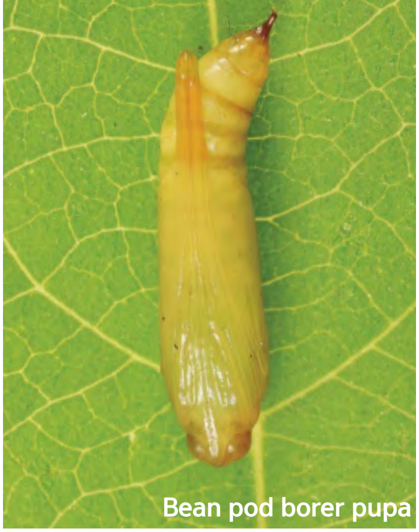
JADAM Natural Control Ratio

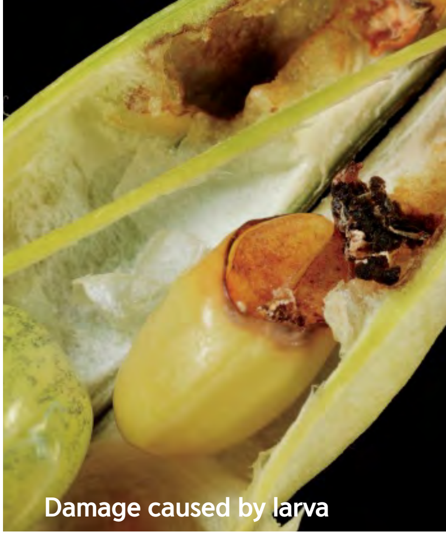
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	Visible effect	10 minutes

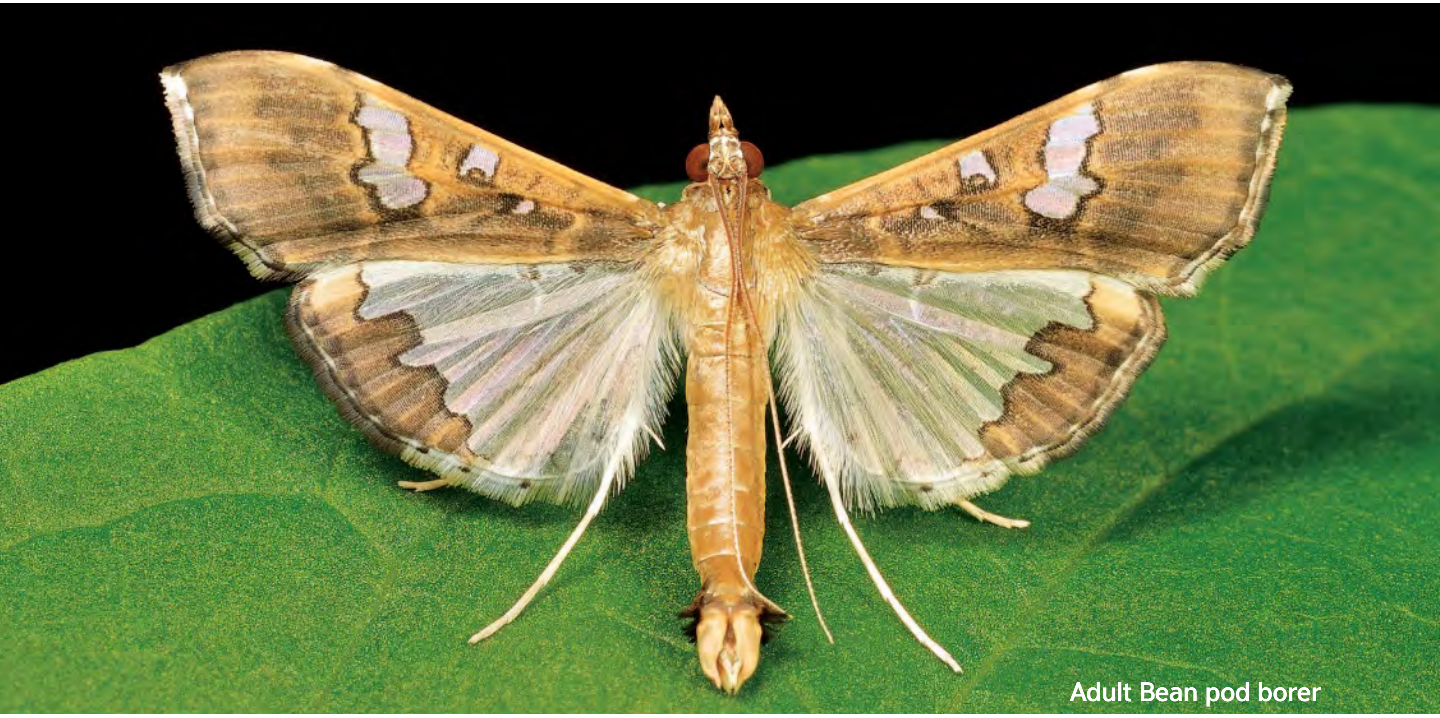
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

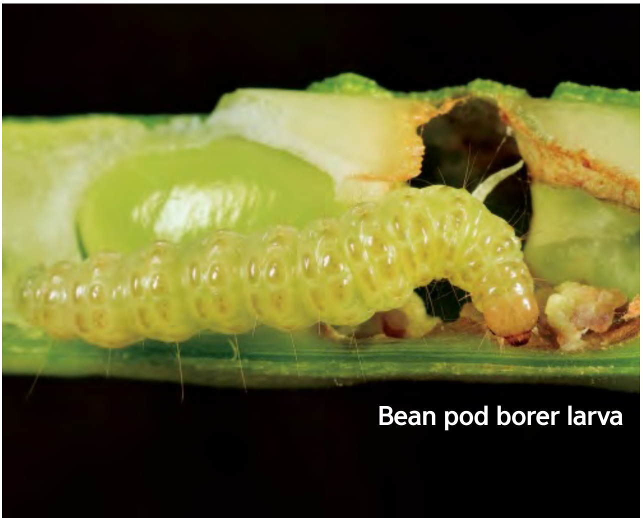
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

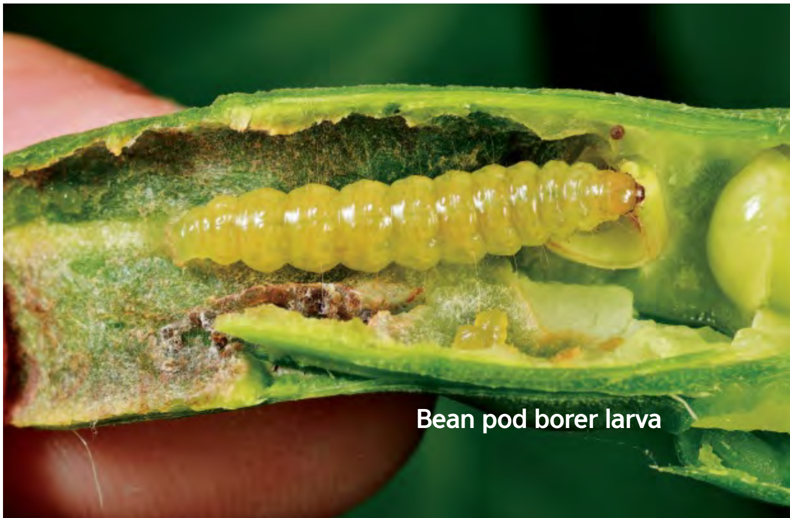

Damage caused by Bean pod borer larva


Bean pod borer pupa


Damage caused by larva


Adult Bean pod borer


Bean pod borer larva


Bean pod borer larva

Beet armyworm

Spodoptera exigua

Description

The armyworm is yellowish-brown with narrow forewings, blue-white or yellow spots in the center of the wings, and there is a kidney pattern on the side. The body length is 15~20mm, and the wingspan is 25~30mm, which is smaller than the tobacco cutworm, oriental tobacco budworm, and cabbage moth.

The eggs are white, laid in a pile of about 30 to 100, and are loosely covered with white dust-like scales. The larvae are yellow-green to dark brown due to severe body color variation and are usually green in many cases. The green type has a scarlet-colored ring around the spiracle, and sometimes there is a black rod-shaped pattern on each segment's dorsal surface. Hatched larvae are about 1㎜ long, and late instar larvae are about 35㎜.

Life cycle

As a thermophilic pest, adult insects begin to appear in May and occur until October. There are many adult insects from late August to late October, and damage occurs until November. The spawning period of adults is 5-8 days, the egg period is 2-5 days, the larval period is 9-23 days, and the pupa period is 5-14 days. The female lays 1,000 eggs as an egg mass. Grown larvae are about 35 mm long and are yellow-green to blackish brown with differing body color variation, but usually green.

Damage

It harms including but not limited to beans, peas, radishes, green onions, onions, potatoes, tomatoes, sweet potatoes, and causes significant damage to Rehmanniae, Chinese cabbage, green onions, and large green onions. They occur 4-5 times a year in the open field and may occur more than once in a warm area. Caterpillars are omnivorous and widely damage vegetables, flowers, and whole crops. In green onions, it penetrates the leaves and injures them from the inside. It attacks as a group in the second to third instar period, and after that, they attacked broadly after dispersing.

(National Crop Pest Management System/NCPMS)

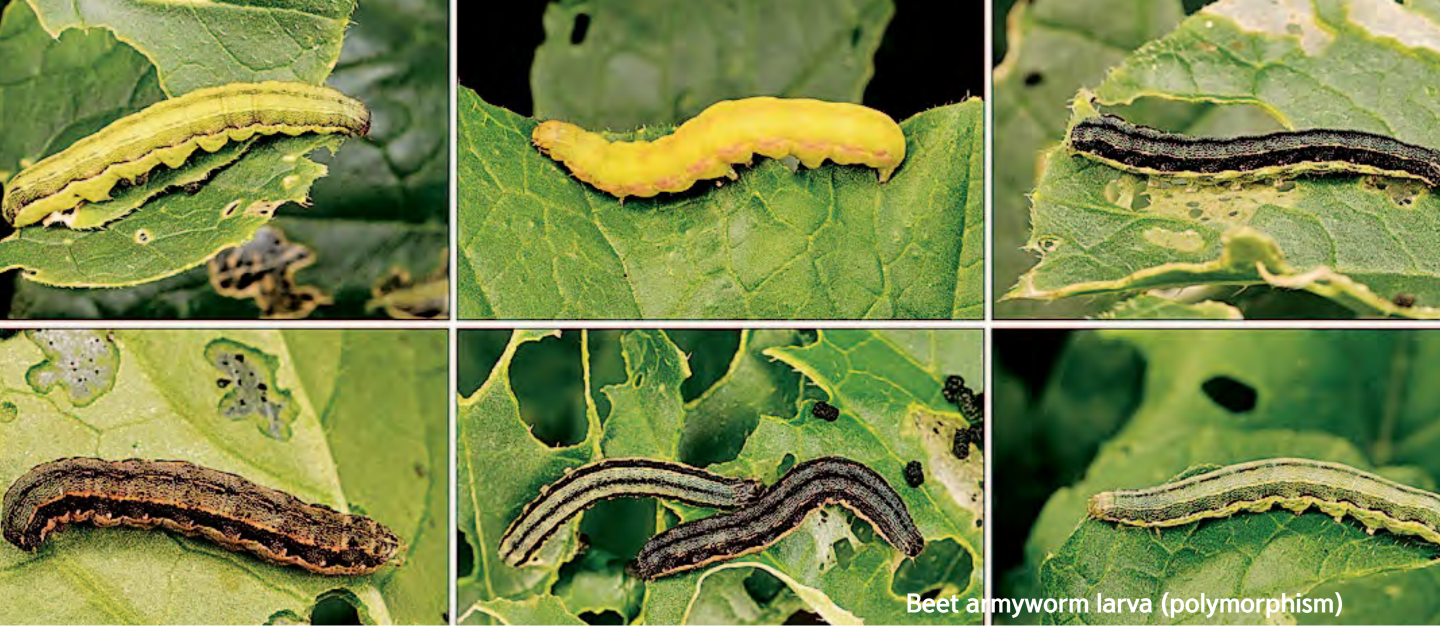
Refer to pages 25, 35~37

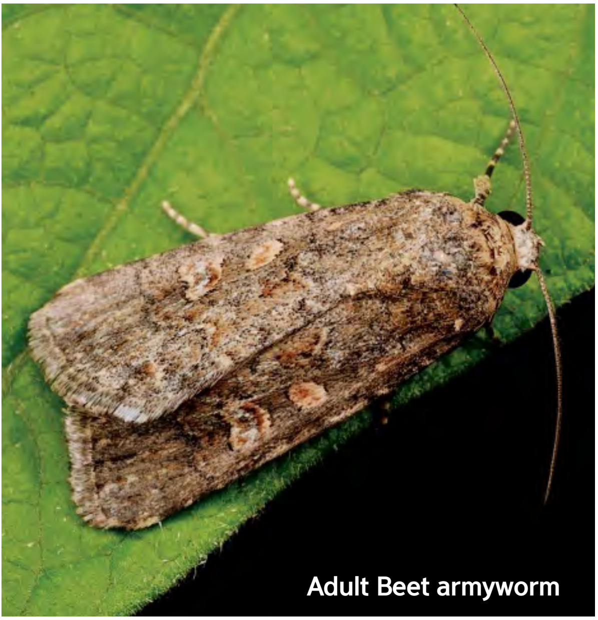
JADAM Natural Control Ratio

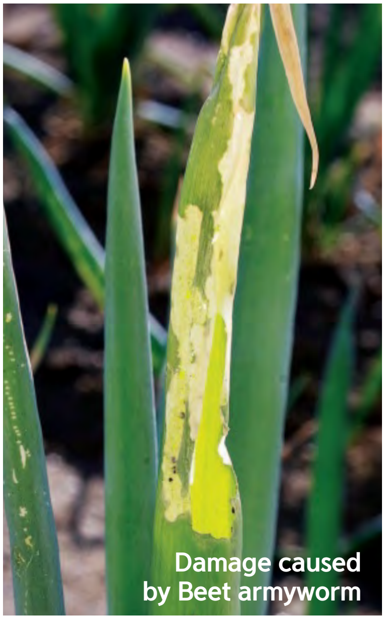
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	5days	**Visible effect**	10 minutes

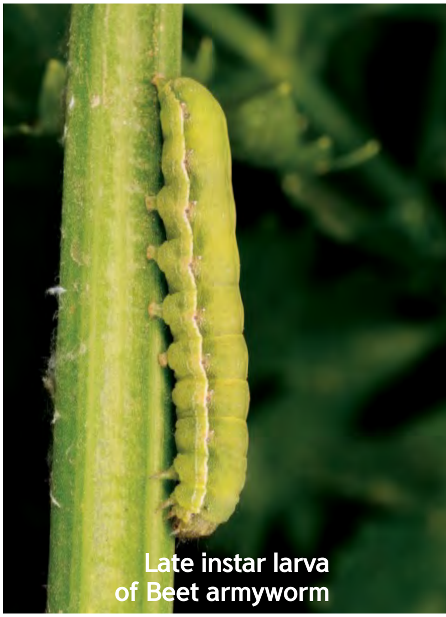
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

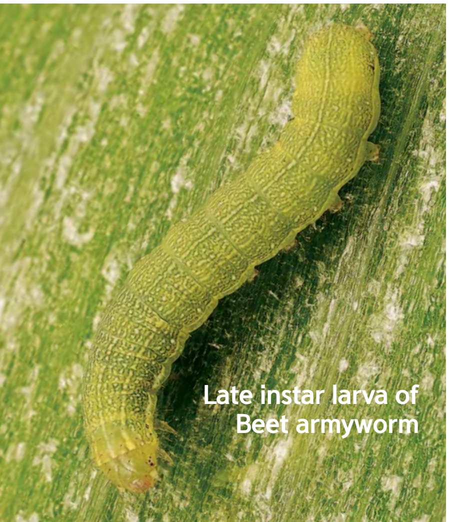
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

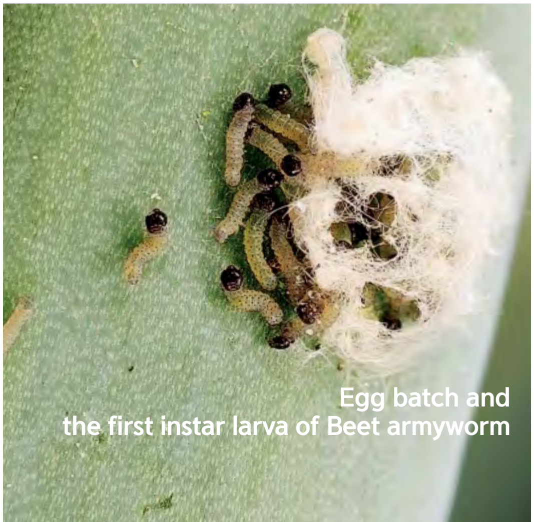

Beet armyworm larva (polymorphism)

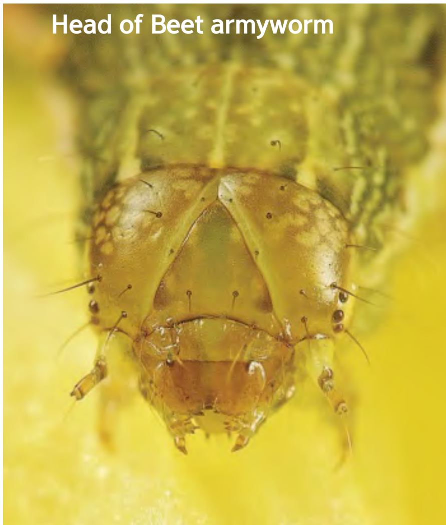

Adult Beet armyworm


Damage caused
by Beet armyworm


Late instar larva
of Beet armyworm


Late instar larva of
Beet armyworm


Egg batch and
the first instar larva of Beet armyworm


Head of Beet armyworm

Asiatic onion leafminer

Acrolepiopsis sapporensis

Description

The body length of an adult insect is about 4.5mm, and it is a small gray-black moth. Eggs are milky white, long oval, and 0.5mm in diameter. The larva has a light brown head and a light green body, but when fully grown, its body length is 7-8mm, and its body color is yellow with red stripes. The pupa is about 4~5mm, turns yellow, and then gradually turns dark yellow or reddish-brown, and is contained in a long oval net-shaped cocoon attached to the leaf surface.

Life cycle

It overwinters as a pupa, but some overwinter as full-grown larva and their development progresses even in the winter. In late June, the first stage adult occurs and the second stage in late August, and in early October the third adult stage. They occur a lot in the main production area for green onion cultivation. If the tip of the green onion turns white or yellow, the occurrence of Allium leafminer can be considered.

Damage

They occur in green onions, garlic, onions, leeks, and the most common season for damage in the field is in early August and mid-September. The hatched larva penetrates the green onion, leaving only the leaf's epidermis by gnawing on the leaf's flesh, resulting in whitening from the leaf's tip and drying or cause irregular short white lines or white or yellow spots on the leaf.

(National Crop Pest Management System/NCPMS)

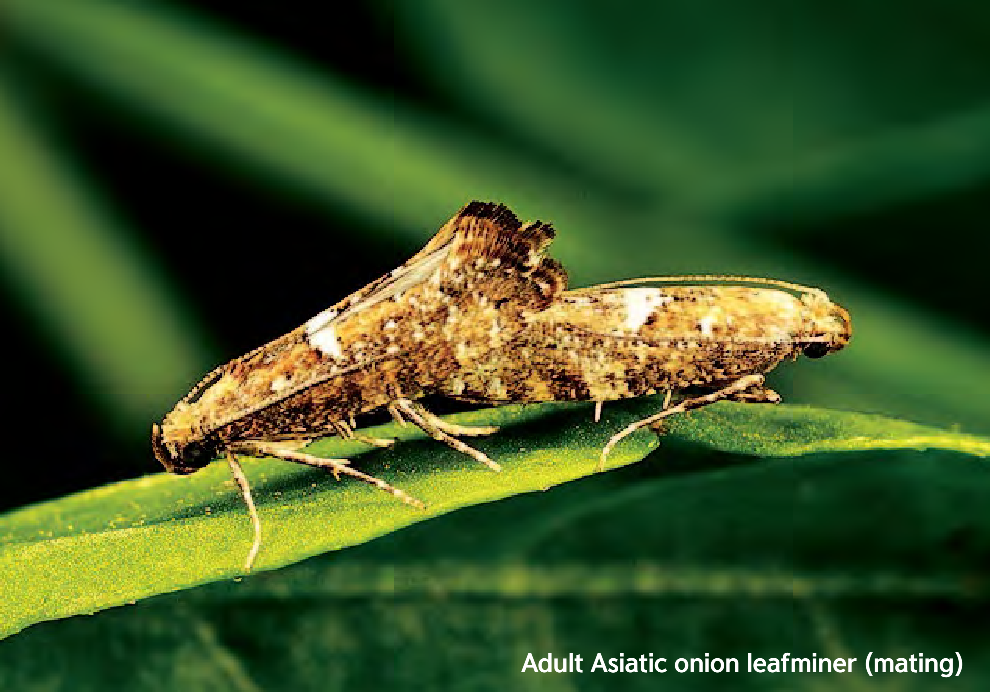
Refer to pages 25, 35~37

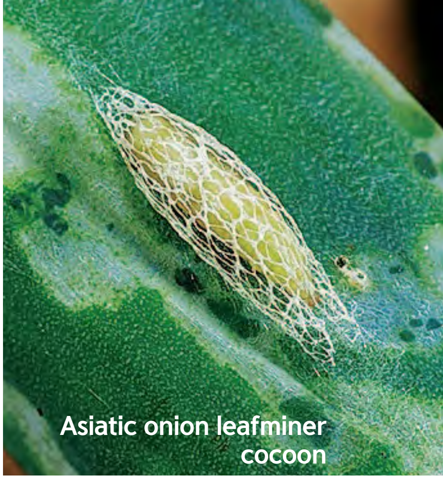
JADAM Natural Control Ratio

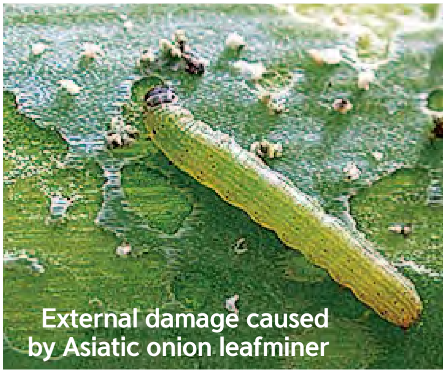
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			60g
Fine soil		40g	60g
Control interval	7days	**Visible effect**	30 minutes

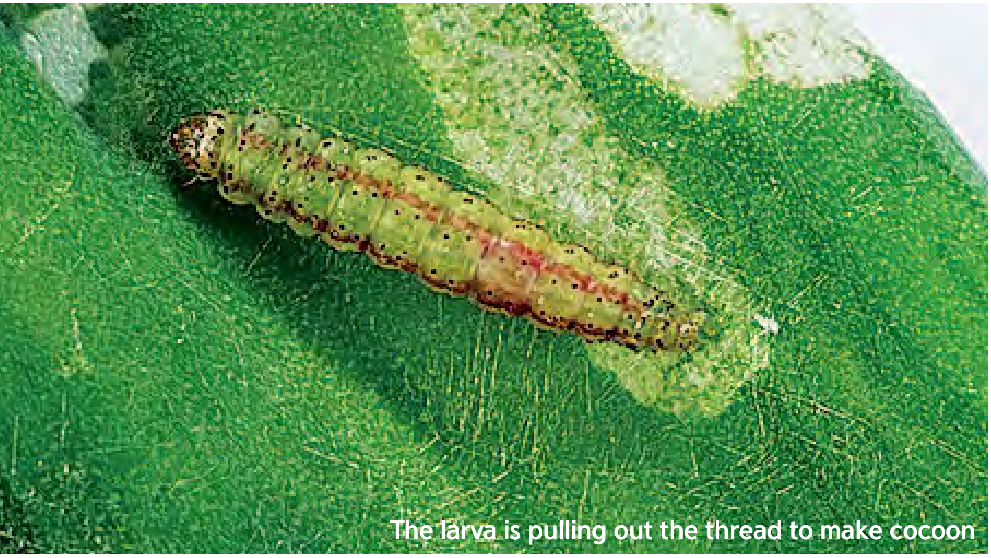
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

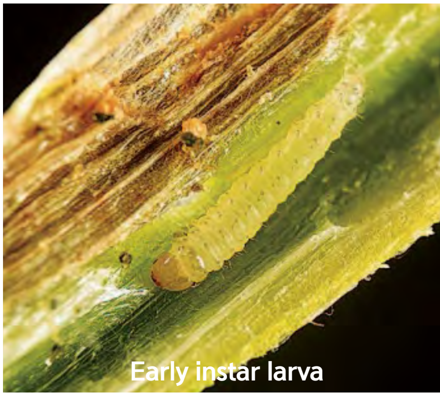
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

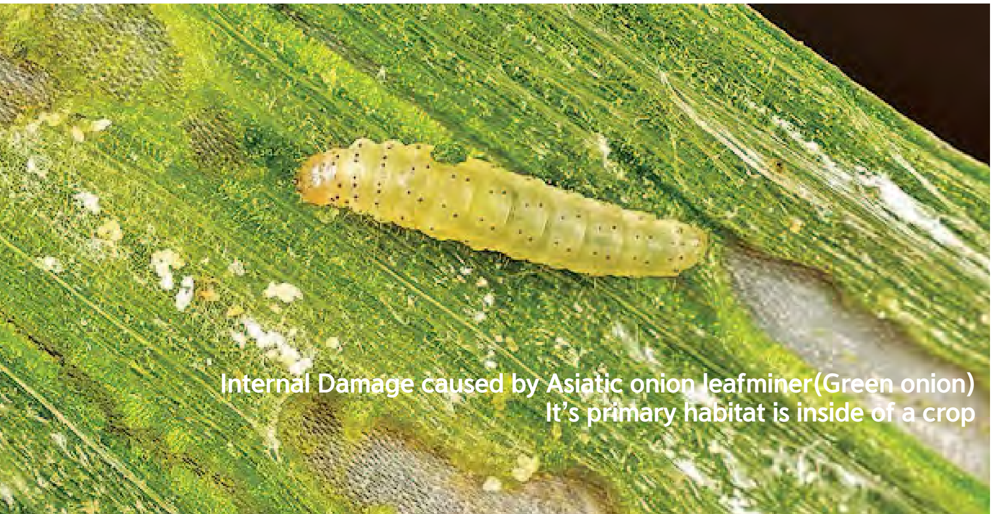

Adult Asiatic onion leafminer (mating)

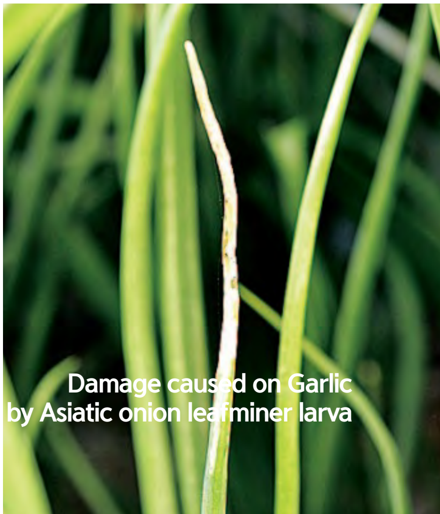

Asiatic onion leafminer cocoon


External damage caused by Asiatic onion leafminer


The larva is pulling out the thread to make cocoon


Early instar larva


Internal Damage caused by Asiatic onion leafminer(Green onion)
It's primary habitat is inside of a crop


Damage caused on Garlic by Asiatic onion leafminer larva

Rice leaf roller

Cnaphalocrocis medinalis

Description

The body length of an adult insect is around 10mm, the length of a wing is about 17mm, and the body color is yellowish-brown. The wing's outer edge is dark brown, and there are two parallel dark brown lines on the fore wing.

Life cycle

The rice leafroller occurs often and damages rice paddies with dark leaves because of the large amount of nitrogen fertilization. It takes about 1 month from egg to adult, the larva goes through up to 5 instar periods, and one adult lays 80-90 eggs. The egg period is 5-7 days, the larval period is 14-20 days, and the pupa period is 7-15 days. In the subtropic region, adult insects occur 2-3 times a year.

The first-generation adult insects occur most frequently from late July to early August, and the second-generation adult insects from early September to mid-September.

Damage

The larva damages leaves from inside while pupating from inside. Damaged leaves turn white, leaving only the epidermis.

(National Crop Pest Management System/NCPMS)

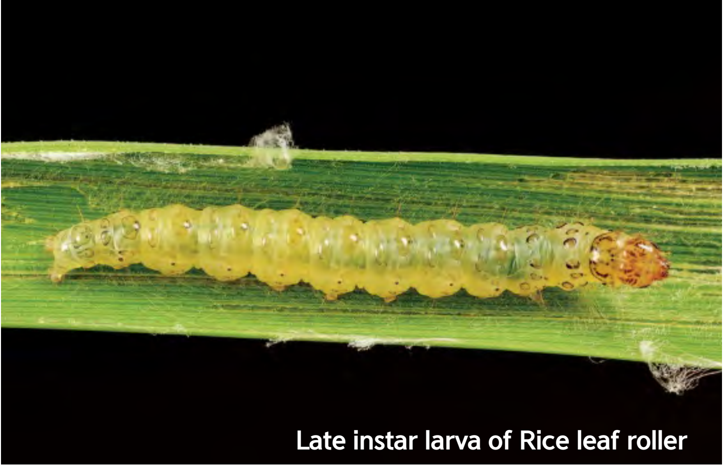
Refer to pages 25, 35~37

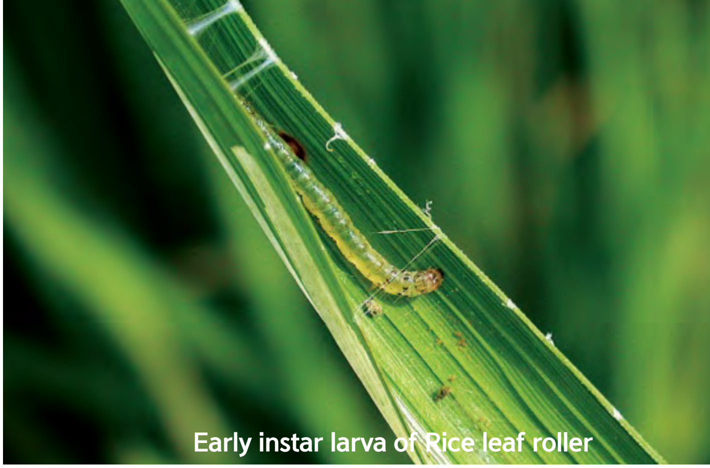
JADAM Natural Control Ratio

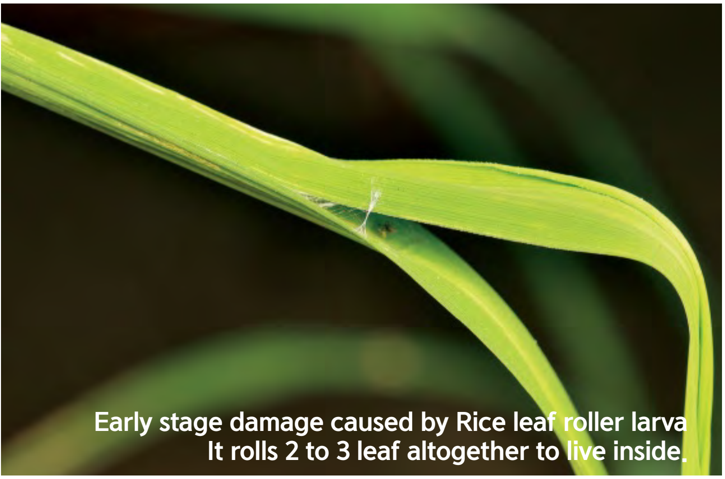
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil			40g
Control interval	10days	Visible effect	30 minutes

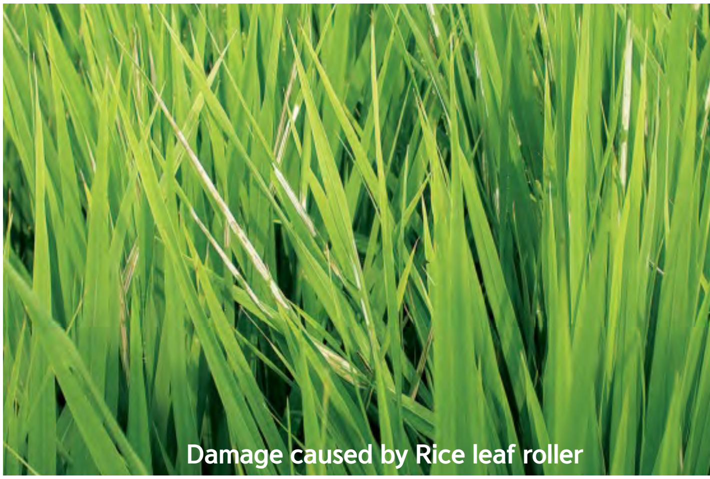
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

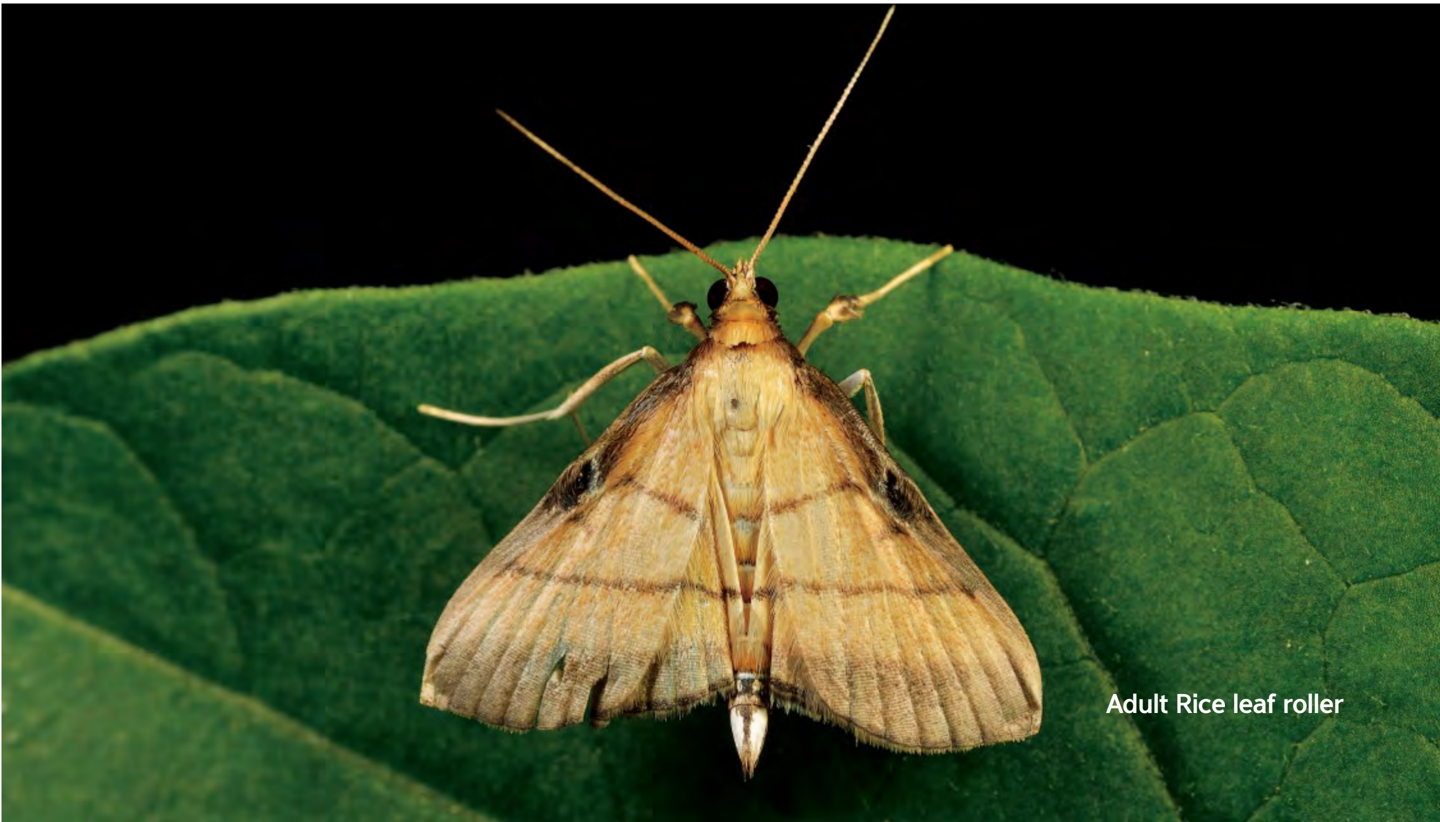
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Late instar larva of Rice leaf roller


Early instar larva of Rice leaf roller


Early stage damage caused by Rice leaf roller larva
It rolls 2 to 3 leaf altogether to live inside.


Damage caused by Rice leaf roller


Adult Rice leaf roller

Amphipyra monolitha

Description

The first impression of the Amphipyra monolitha is imposing. The pest group gathers on the wall of buildings near the mountains, it doesn't run from threats and has a fairly substantial body. Sometimes it walks and wanders around damaging apple tree leaves, it eventually begins to stand out in various areas during the spring season. This species has a similar look to the Copper underwing (Amphipyra pyramidea).

The larvae are about 40~45㎜ long, their body is quite thick, and the color is light green with scattered white spots. The abdomen is divided into 9 segments with a conical protrusion, there are clear yellow lines all over its body.

Life cycle

Amphipyra monolitha guenees drills a hole inside of a new peach bud and damage it. They start to damage branches and slowly move down. Sometimes they drill a hole inside of flower buds and stay there. Generally, they appear in the early spring and damage the new leaves and buds.

There will be damages during early May by early-instar larvae and they become pupas during late June. From late June to early July, they become an adult. There is no report about their wintering. (Deokgi Park)

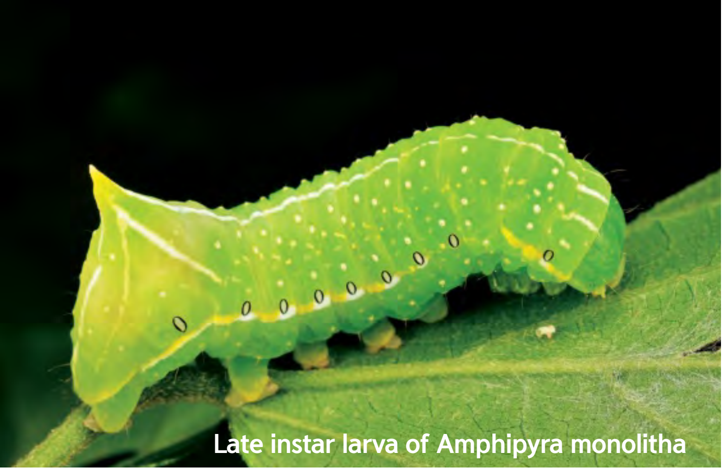
Refer to pages 25, 35~37

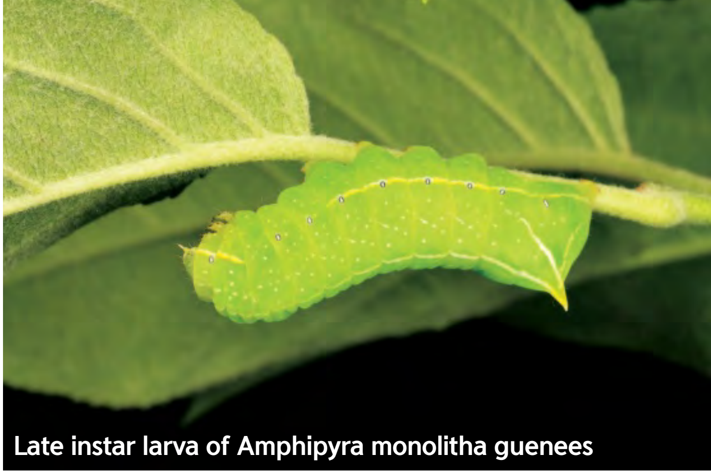
JADAM Natural Control Ratio

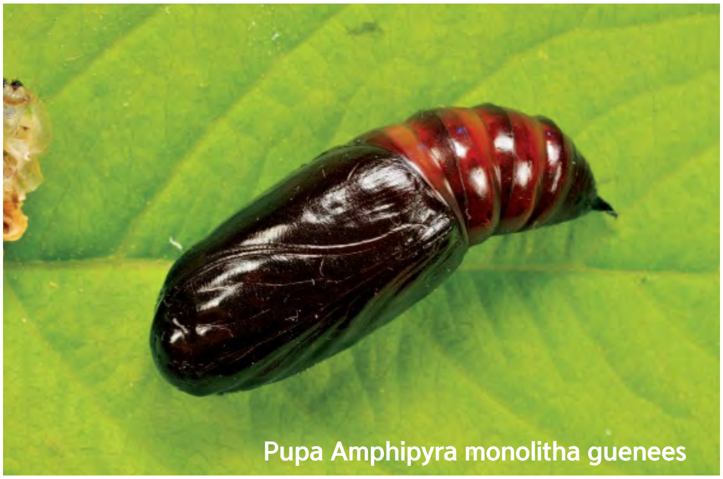
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil			40g
Control interval	10days	**Visible effect**	10 minutes

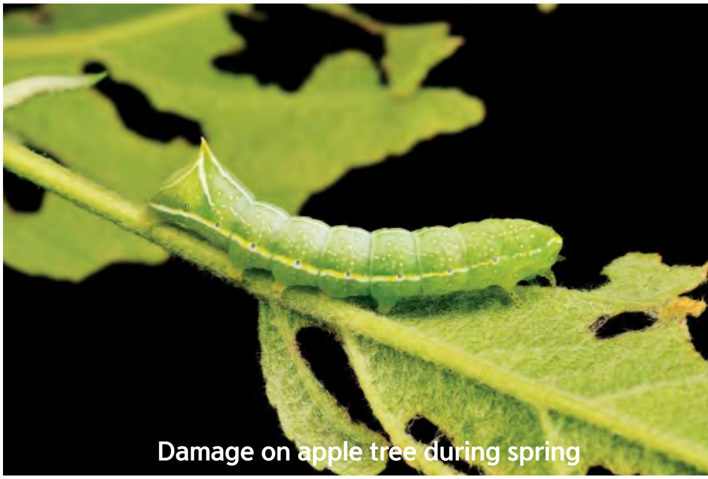
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

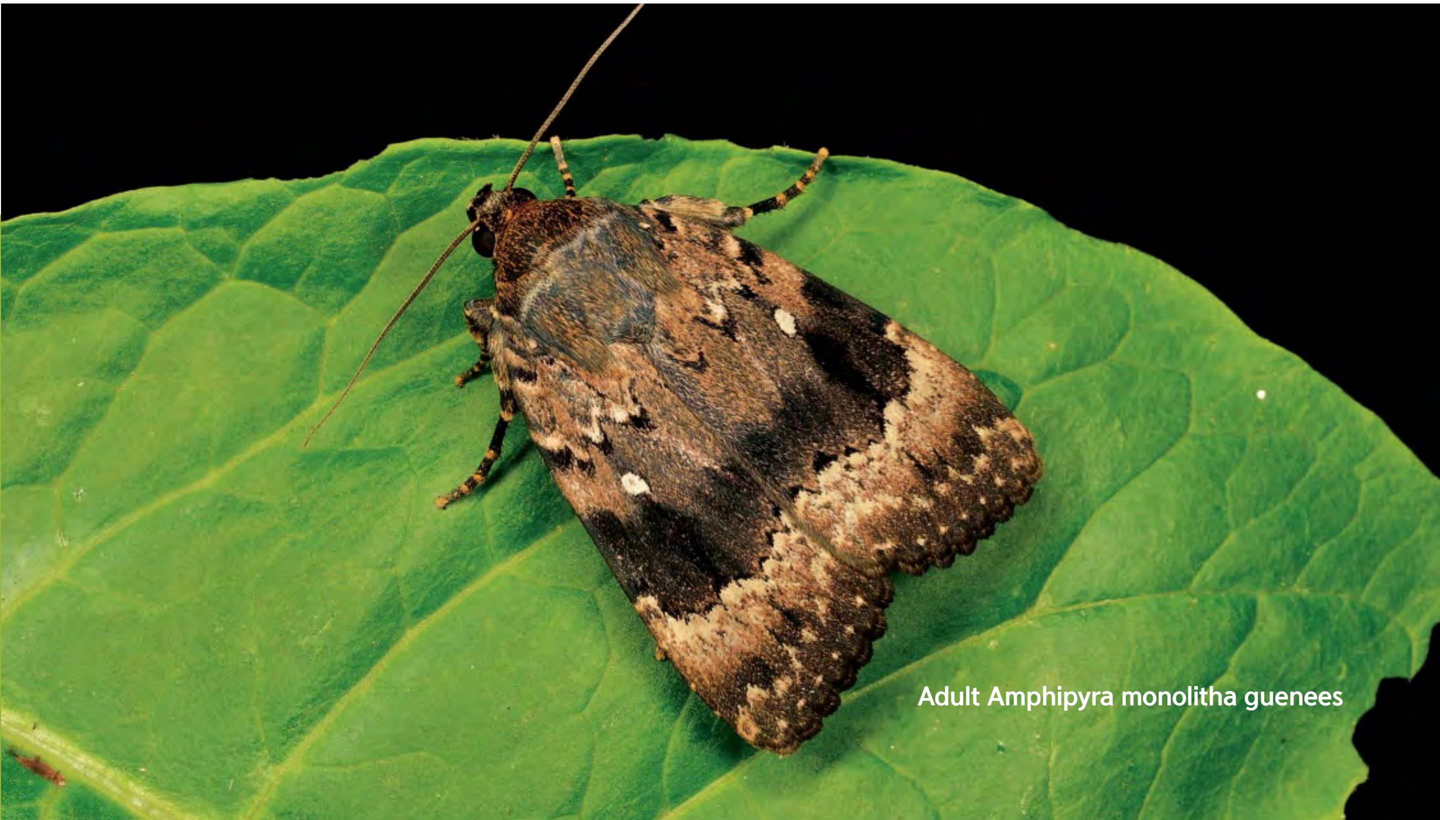
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Late instar larva of Amphipyra monolitha


Late instar larva of Amphipyra monolitha guenees


Pupa Amphipyra monolitha guenees


Damage on apple tree during spring


Adult Amphipyra monolitha guenees

Brown tail moth

Euproctis chrysorrhoea

Description

Brown tail moth is white, and the length of the fore wing of an adult is 12-22mm. Its primary host fruit trees are jujube, apple, pear, persimmon, peach, plum tree, cherry tree, Lagerstroemia tree, and oak trees. There are 2 dark brown patterns on the posterior edge of the fore wing. The larva's body length is about 25mm, and the body color is divided into the yellow and dark brown types.

Life cycle

They occur twice a year and overwinter as a larva. They become pupa in late May, the first generation adult insects occur in June and the second generation emerges in August-September. Larvae appear in June-July and August-September, and they spawns eggs in piles on the backside of leaves. When they are young, they have a habit of living together and disperse as they grow up.

Their natural predators include parasitic natural predators, Brachymeria obscurata, Exorista japonica, Pimpla disparis Viereck, Trichogramma dendrolimi, Glyptapanteles liparidis and insect pathogenic microorganisms include Bacillus thuringiensis (BT) and polyhedral viruses. (Korea National Arboretum)

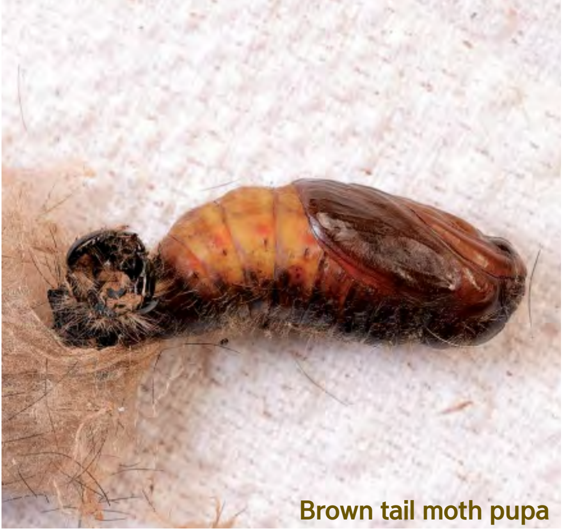
Refer to pages 25, 35~37

JADAM Natural Control Ratio

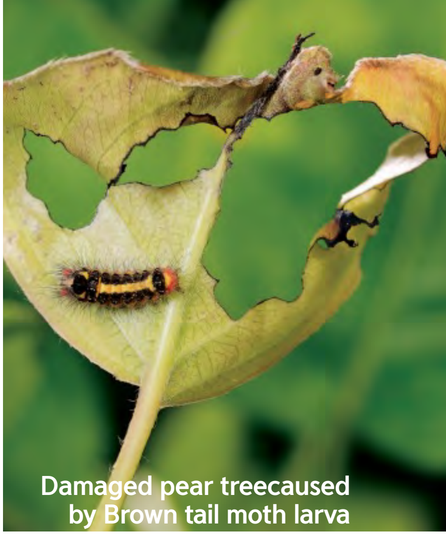
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	Visible effect	10 minutes

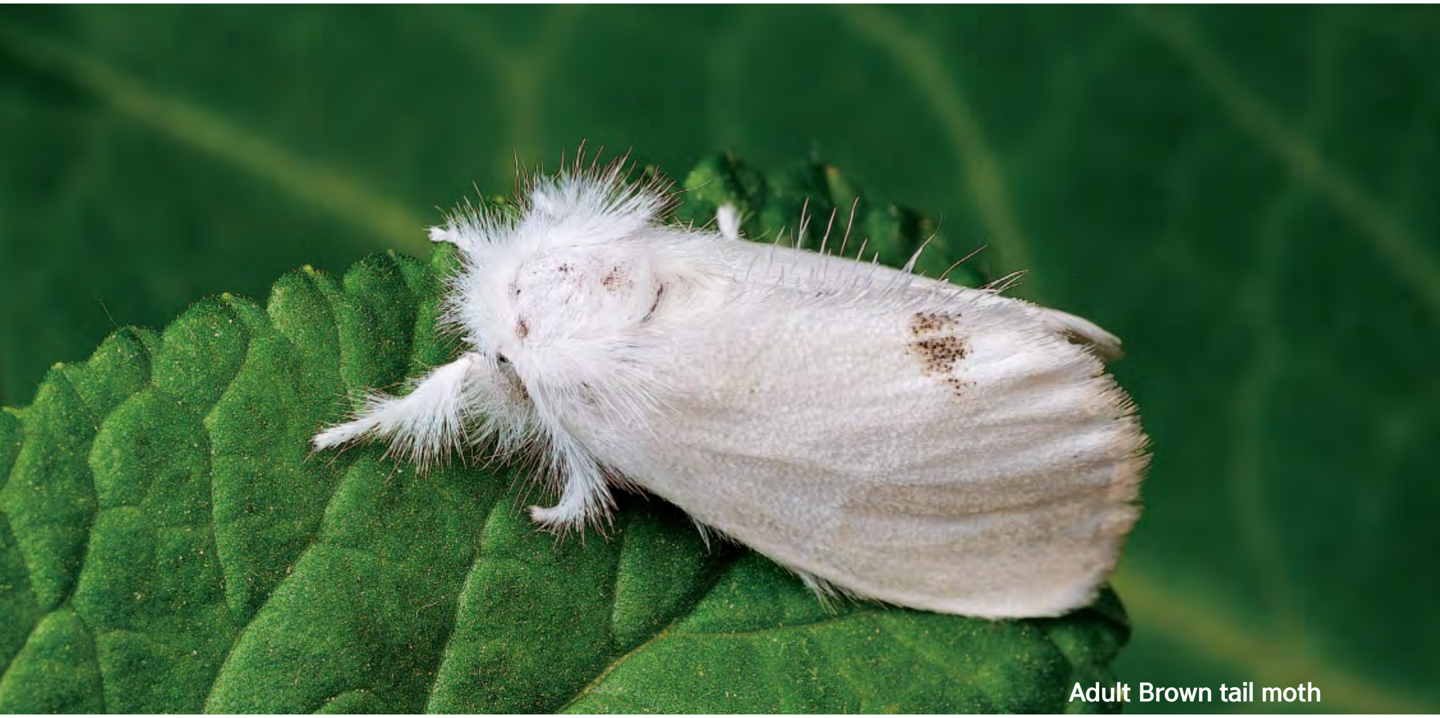
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

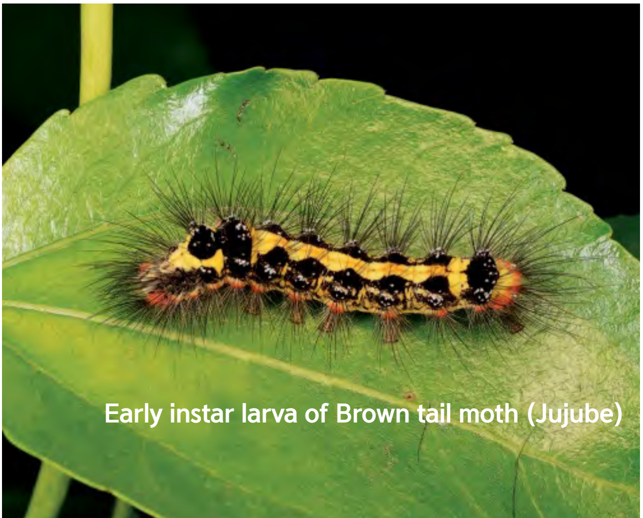
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

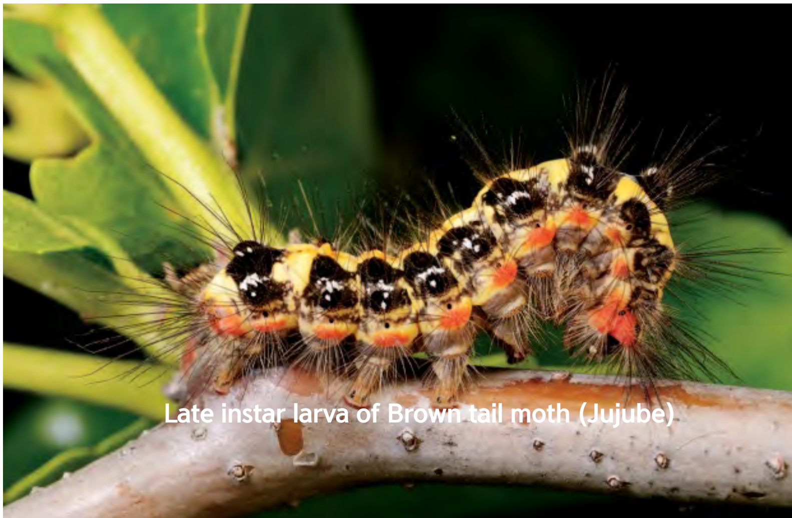

Brown tail moth pupa

Damage caused by the larva


Damaged pear treecaused by Brown tail moth larva


Adult Brown tail moth


Early instar larva of Brown tail moth (Jujube)


Late instar larva of Brown tail moth (Jujube)

Beet webworm moth

Hymenia recurvalis

Description

It has a body length of 15mm, and the wingspan is 20~24mm. The wings of adult insects are dark brown and have a horizontal thick white band pattern on their fore wings, making it easy to distinguish them. The hind(rear)wing also has a dark white band pattern on the middle part. The head is white, but there is a black pattern on the front.

Life cycle

Adult insects appear from June to November, and as each instar period is found in autumn, it seems that the number of annual occurrences is high, and they occur irregularly. It overwinters as a pupa, and adults are attracted to lanterns.

It spawns 1 to 5 eggs on leaf vein's backside, and the hatched larvae roll the leaf along the leaf veins; as it grows, it rolls the leaves slightly or bundles 2-3 sheets from the inside. The larva is very sensitive, and when touched, it wriggles backward and falls to the ground.

Damage

The larvae roll or bundle the leaves of the crop and gnaw irregularly on the back of the leaves. If the damage is severe, only petioles and leaf veins will remain.

(National Crop Pest Management System/NCPMS)

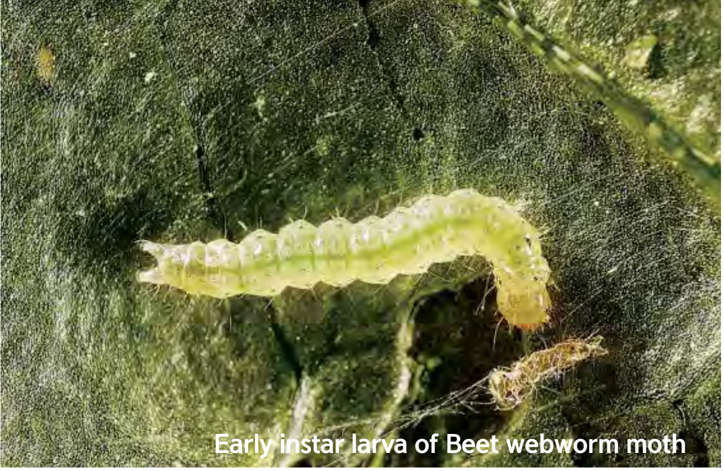
Refer to pages 25, 35~37

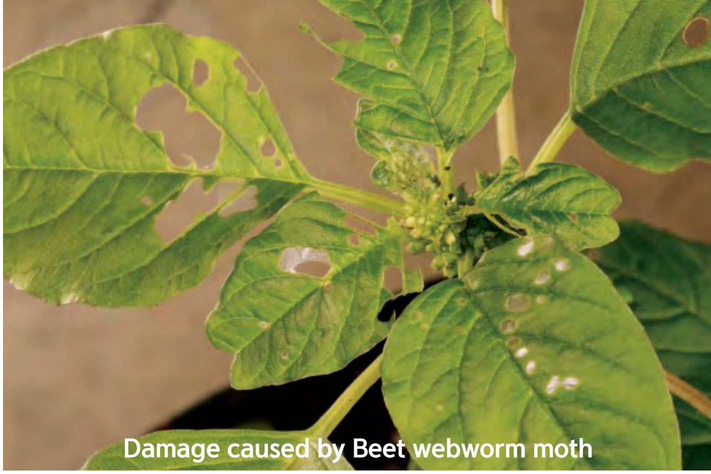
JADAM Natural Control Ratio

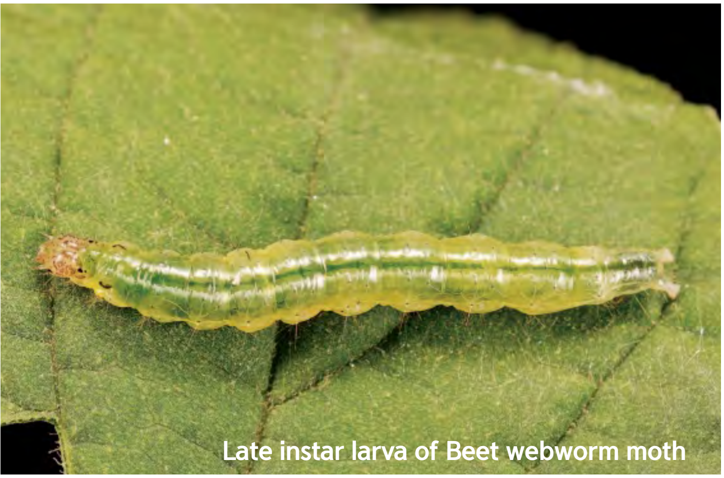
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	Visible effect	10 minutes

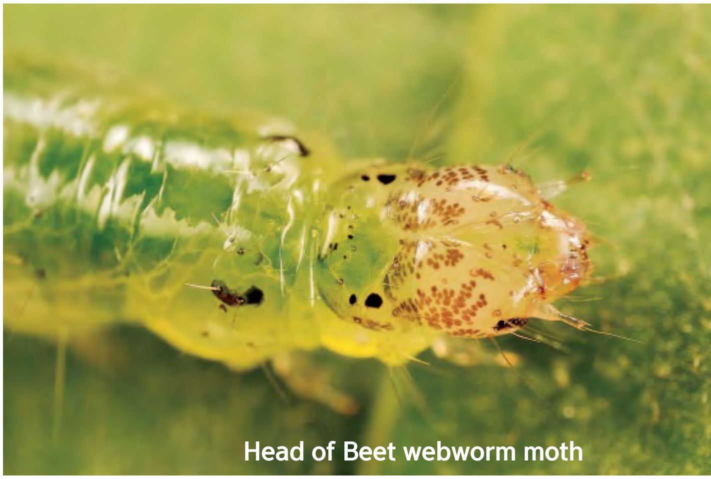
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

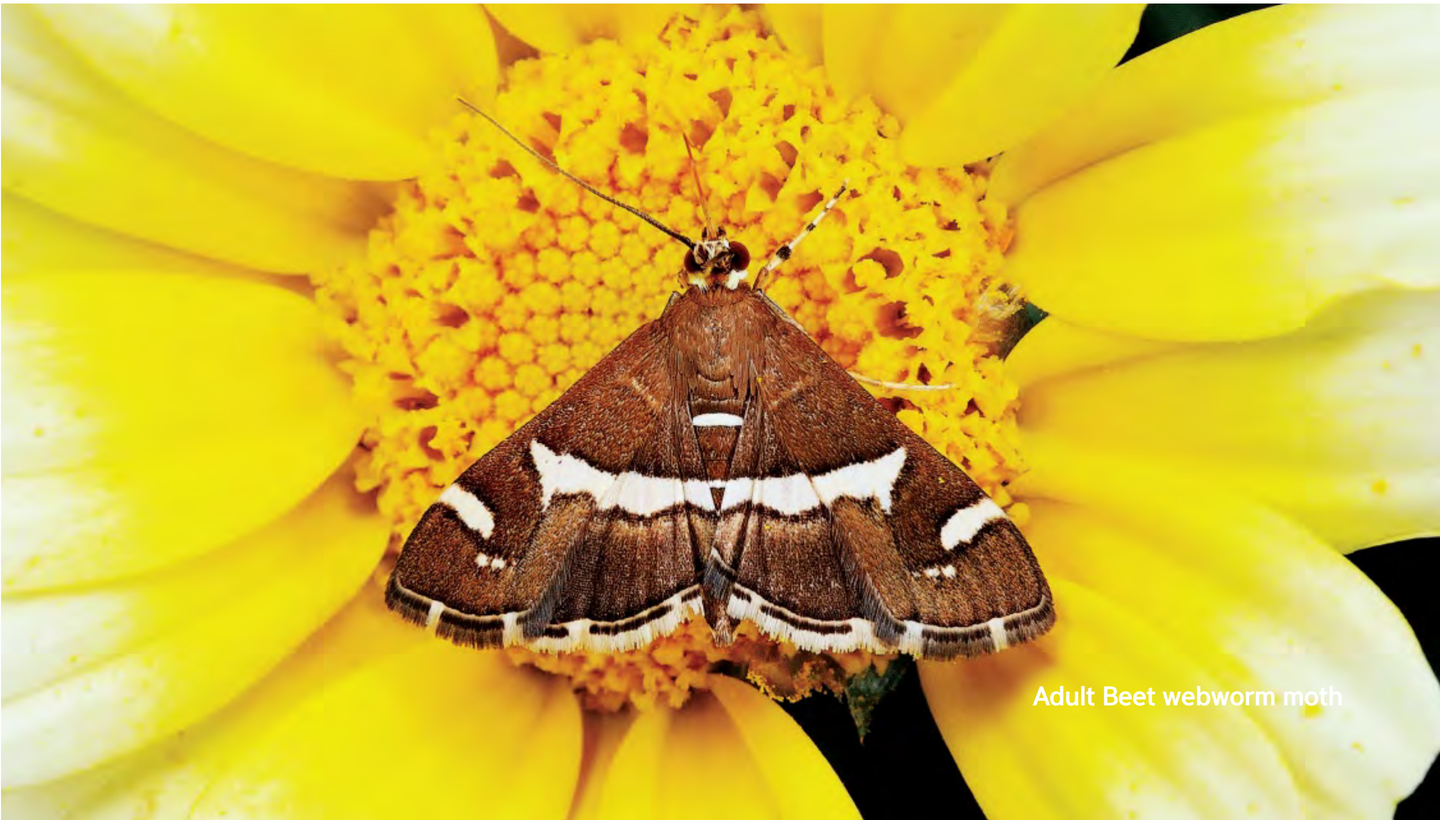
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Early instar larva of Beet webworm moth


Damage caused by Beet webworm moth


Late instar larva of Beet webworm moth


Head of Beet webworm moth


Adult Beet webworm moth

Leafhopper, Planthopper

These insects are colloquially known as hoppers. These are plant feeders that suck plant sap from grass, shrubs, or trees. Their hind legs are modified for jumping, and are covered with hairs that facilitate the spreading of a secretion over their bodies that acts as a water repellent and carrier of pheromones. They undergo a partial metamorphosis, and have various host associations, varying from very generalized to very specific. Some cosmopolitan species can live in both in temperate and tropical regions. Some are pests or vectors of plant viruses and phytoplasmas. The family is distributed all over the world, and constitutes the second-largest hemipteran family, with at least 20,000 described species.

The cicada mouth can pierce the crop and sucks plant sap (fluid).The diet of cicadas generally consists of sap obtained from a broad and diverse range of plants, but some are host-specific. Although cicadas are primarily herbivores, some are known to sometimes eat small insects such as aphids. (wikipedia)

Pochazia shantungensis

Description

The body length of adult insects is 8.5~9㎜ in females and 8~8.3 ㎜ in males, and the male has a pointed abdomen, and the female is round. The eggs have a milky white color similar to rice grains, and the length is less than 1㎜. It spawns eggs in the form of masses on the branch. The egg mass length is about 1.5 to 2.3 cm, and there are about 15 to 30 eggs in two rows in one egg mass.

There are up to 5 instar stages of a nymph, and the size of each stage is 1.0, 2.1, 3.2, 6.5, and 7.1㎜. The size of the third and fourth instras is very different, but the fourth and fifth instars are similar in size.

Life cycle

The *Pochazia shantungensis* occurs once a year, and after spending the winter in an egg state, it hatches around May and stays in the state of a nymph. It eats more sap than an adult during the nymph period and becomes an adult through molting 4 times. It becomes an adult in mid-July and spawns on the branches of plants from mid-August after going through the entire spawning period of about one month. They mainly spawn on the branches of young one-year-old trees and can damage the growth of trees.

Damage

They suck and gnaw the sap of crops during the nymph period, which can interfere with the plants' growth and reduce the number of fruits. The secretions of nymphs remains on fruits, leaves, and branches, causing soot disease, which degrades the fruit's value. *Pochazia shantungensis* lay eggs on young tree branches, which inhibits the water movement inside the branches, causing them to dry out. Depending on the crop, there are cases where the damage caused by egg spawning is more significant than the damage caused by the adult brown-winged worms or nymphs absorbing the sap. They even spawn on trees and shrubs in the forest, and despite pesticide use on farms, adult insects continue to fly, causing damage from spawning.
(National Crop Pest Management System/NCPMS)

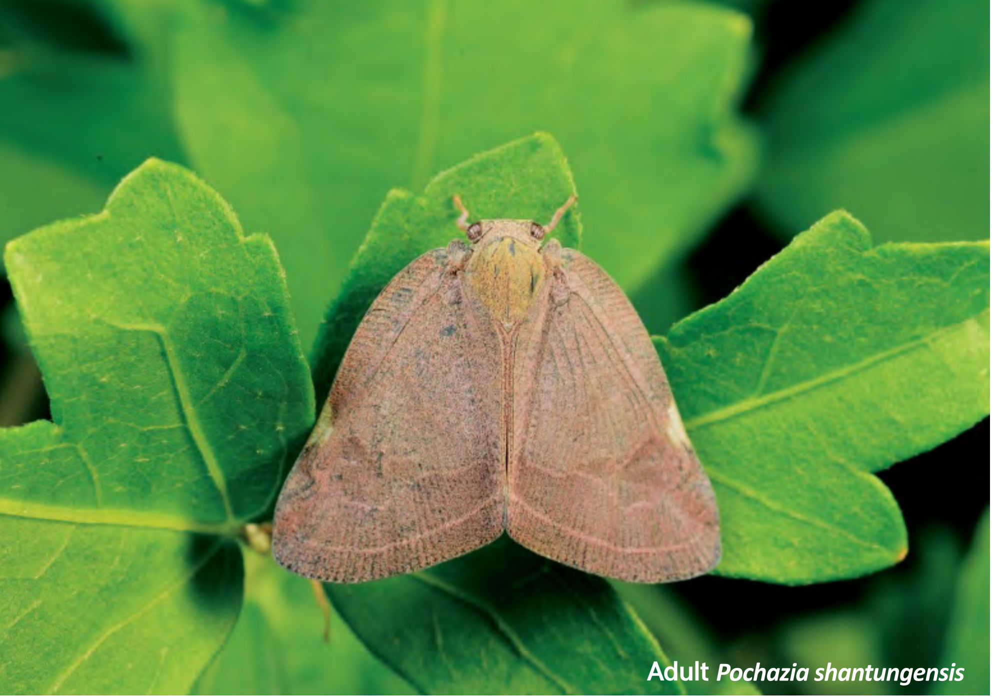
Refer to pages 25, 35~37

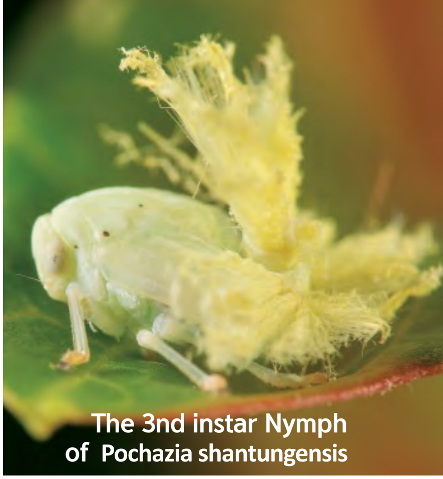
JADAM Natural Control Ratio

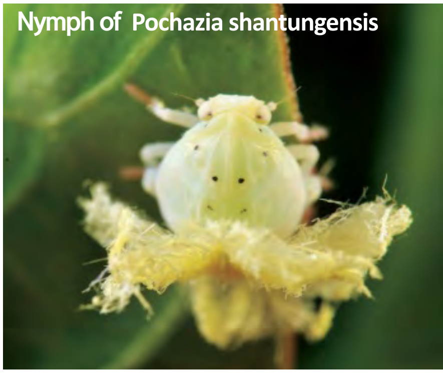
Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS	600ml	500ml	600ml
JMS			
NaOH	60g	40g	60g
Fine soil	80g	40g	60g
Control interval	7days	**Visible effect**	10minutes

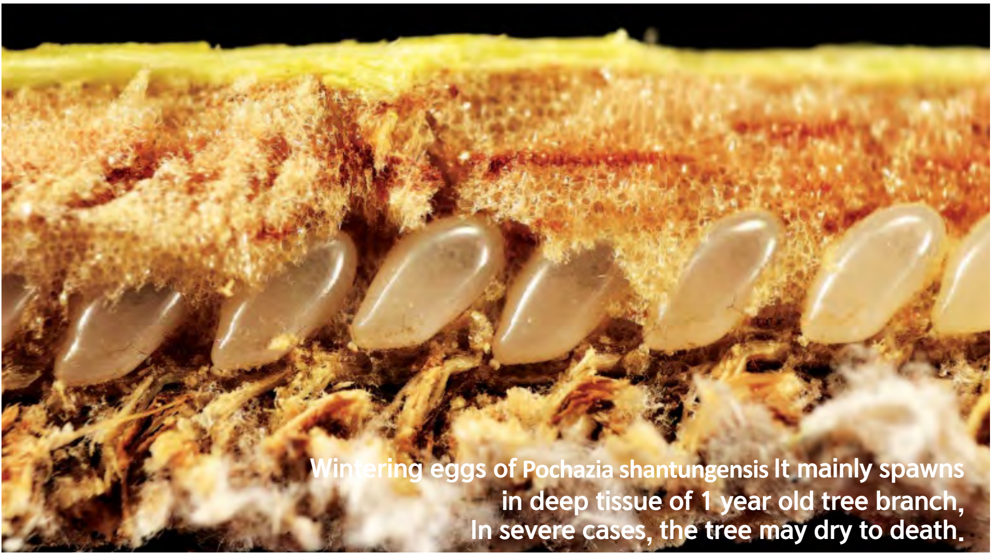
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- This pest flies away when spraying pesticides and then comes back. To complete control, it is recommended to control 2-3 times at intervals of 1 to 2 days.

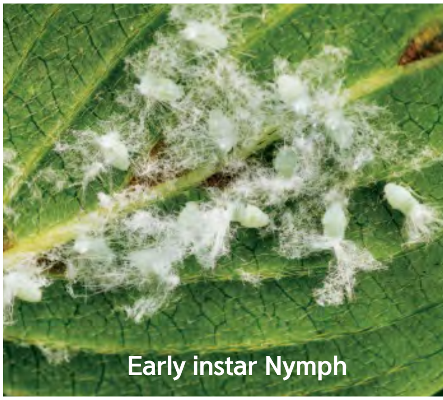
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

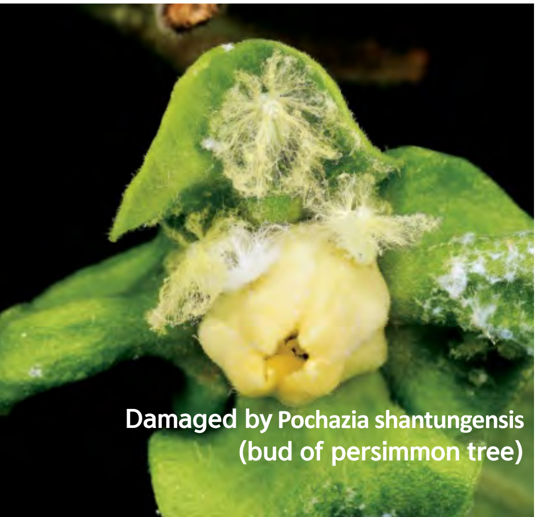

Adult *Pochazia shantungensis*

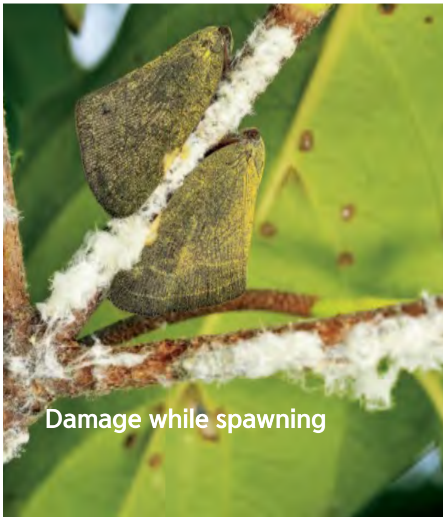

The 3nd instar Nymph
of Pochazia shantungensis


Nymph of Pochazia shantungensis


Wintering eggs of Pochazia shantungensis It mainly spawns
in deep tissue of 1 year old tree branch,
In severe cases, the tree may dry to death.


Early instar Nymph


Damaged by Pochazia shantungensis
(bud of persimmon tree)


Damage while spawning

Zorka sp

Description

The body length of an adult insect is about 3~4mm, and the fore wing has a pale yellow pattern on a milky white background. The nymph has a pale yellow pattern on a milky white or light green background. They leave white spots of 1mm or less appear around the leaf veins on the leaf's front surface, and when the damage is severe, spots are formed on the entire leaf.

Life cycle

The detailed life history has not been studied, and it is estimated that adult insects and nymphs infest from early June to early September after wintering as an adult.

Damage

The damage and symptoms on persimmons are very similar to the symptoms caused by Asiacornococcus kaki. However, the difference between the two is that they form yellow spots on the leaves' front surface, and the leaves' backside becomes dirty looking. (Common tree pest and disease)

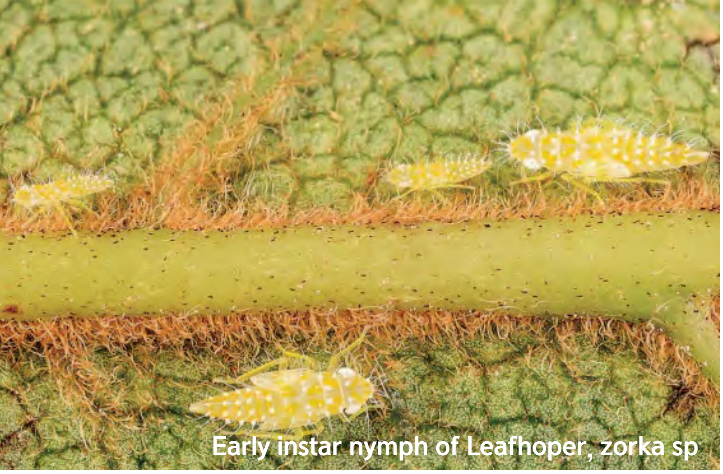
Refer to pages 25, 35~37

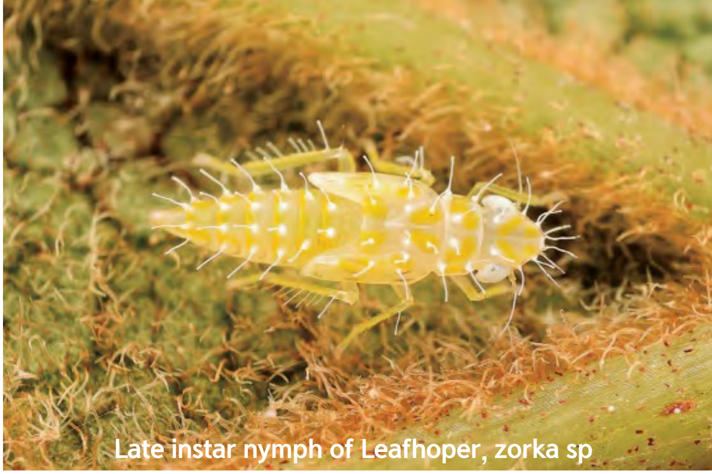
JADAM Natural Control Ratio

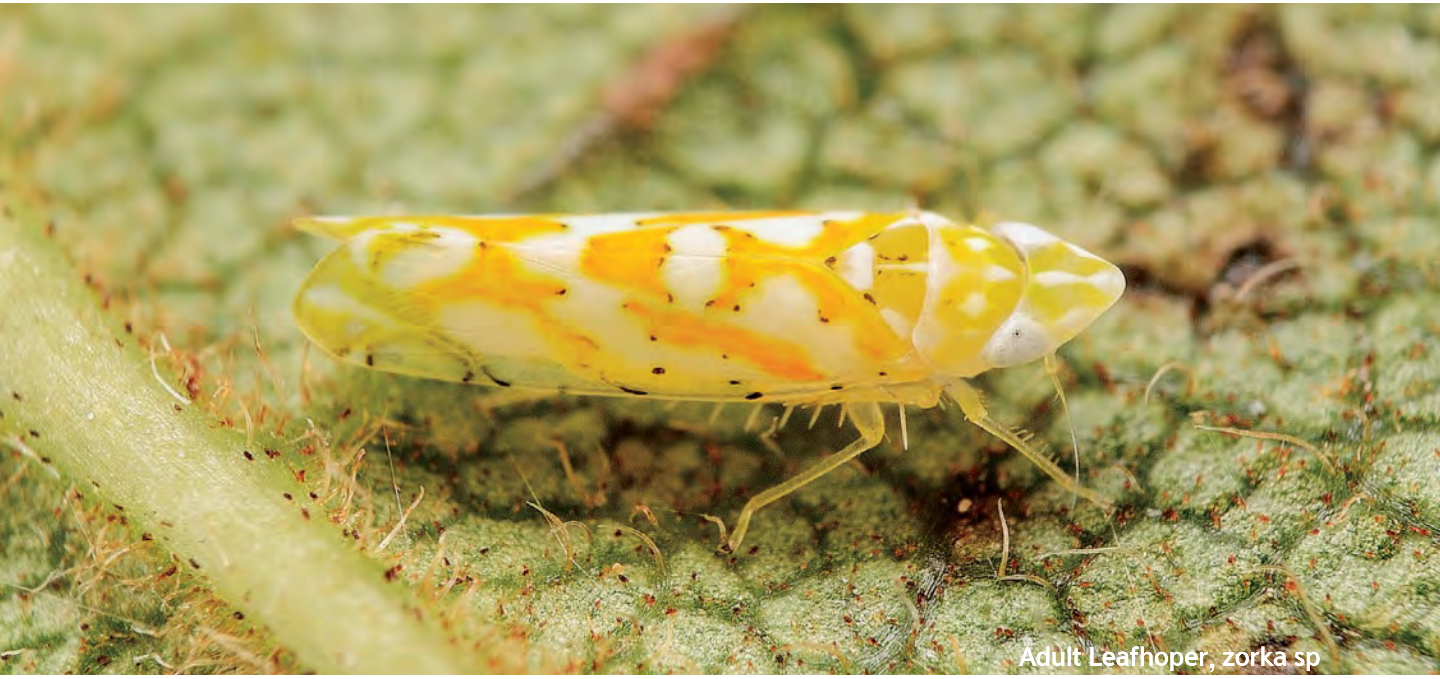
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	1~2days

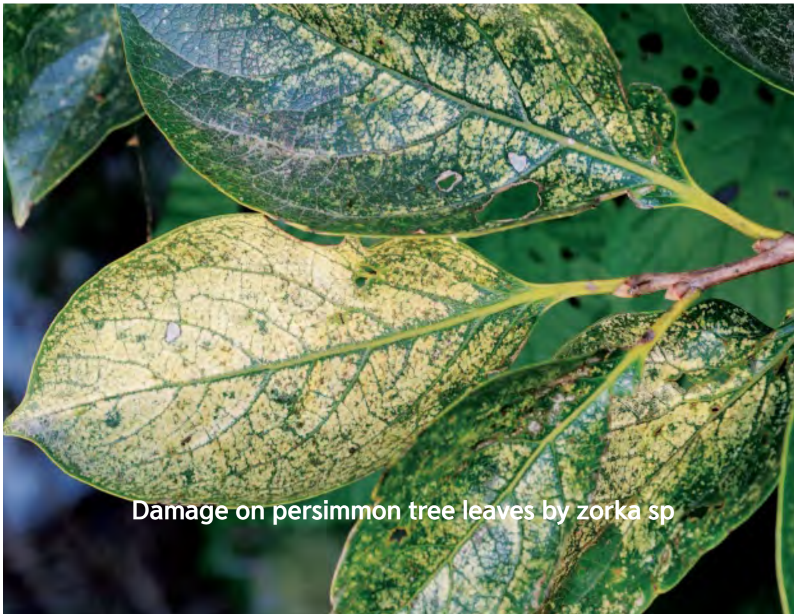
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Early instar nymph of Leafhoper, zorka sp


Late instar nymph of Leafhoper, zorka sp


Adult Leafhoper, zorka sp


Damage on persimmon tree leaves by zorka sp

Aguriahana triangularis

Description

Body length is about 3.3mm. The dorsal surface of the body is yellow, pale yellow-white, brown, and black. The head is light yellow and protrudes forward, and the tip is yellow. The midline appears on back, and the compound eyes are dark brown. The back of the pronotum is convex in the center, and all the parts except for the bullet-shaped pale yellowish brown center are jet black. Pale yellow patterns on the crown and pronotum are continuous forming a large V-shape. The small mesoscutum is dark brown, and a thin horizontal groove is in the center. The wing is translucent, has a long vertical pattern on the center of the wing, and has 4 brown horizontal lines on the anterior edge. There is a light white part around the end of the unguis, and they have a faint oval pattern on top this pattern. The underside of the body is pale yellow, the abdomen is black except for the base, and the pronotum is also black. (Korea National Arboretum)

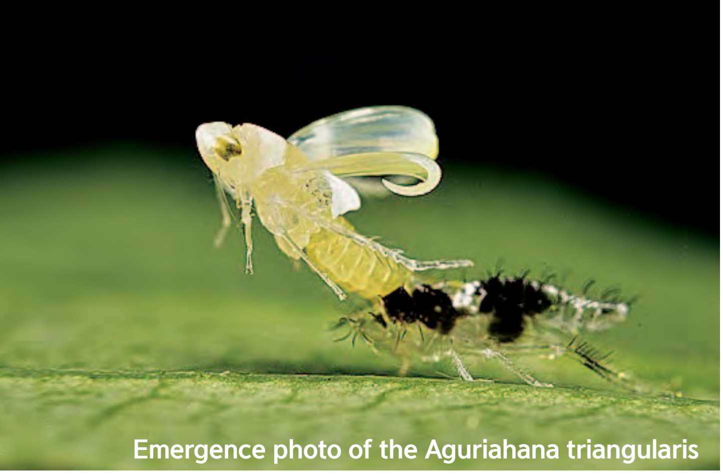
JADAM Natural Control Ratio

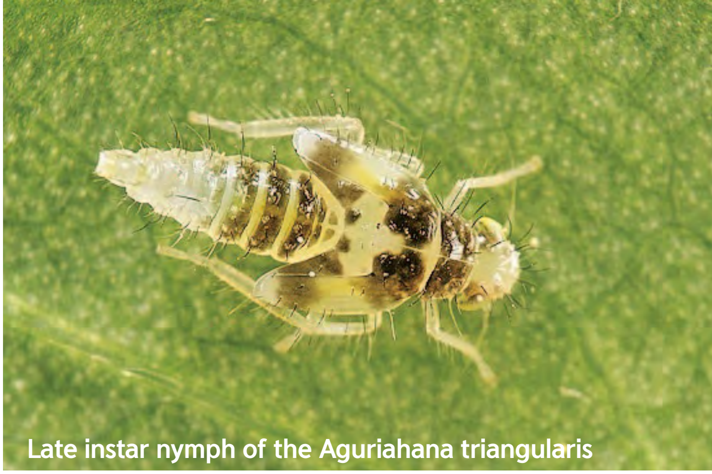
Refer to pages 25, 35~37

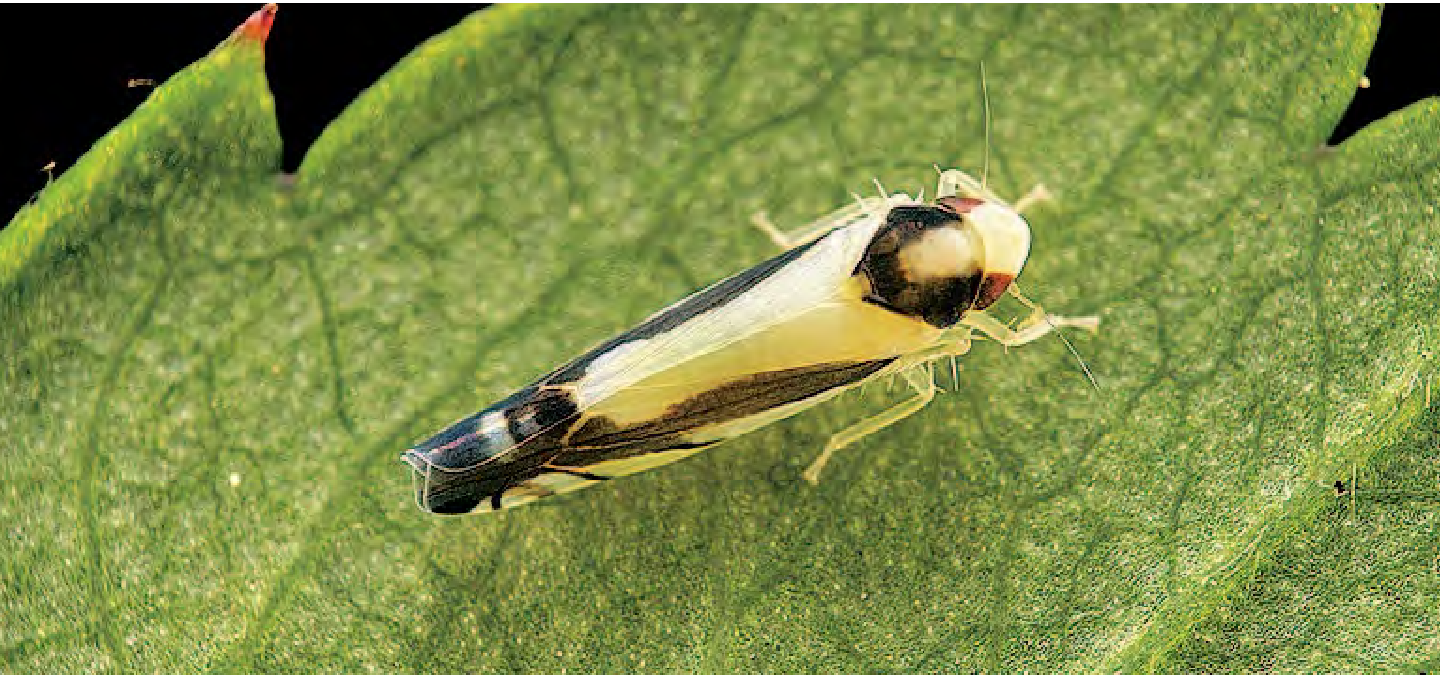
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH		40g	60g
Fine soil		40g	40g
Control interval	10days	**Visible effect**	1~2days

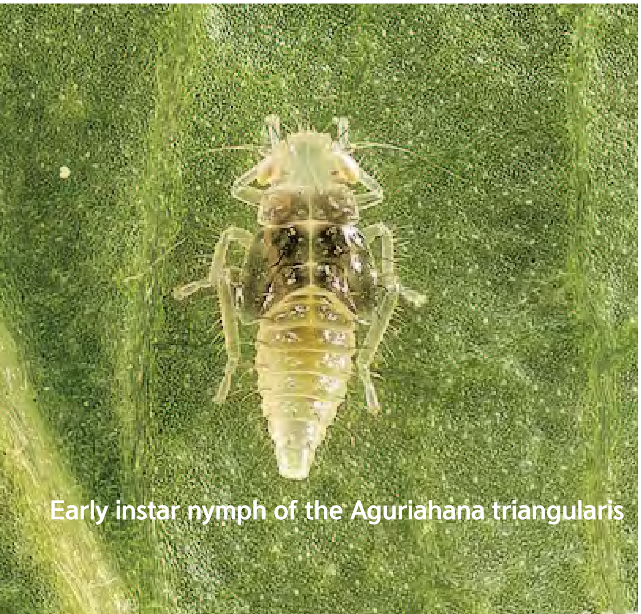
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

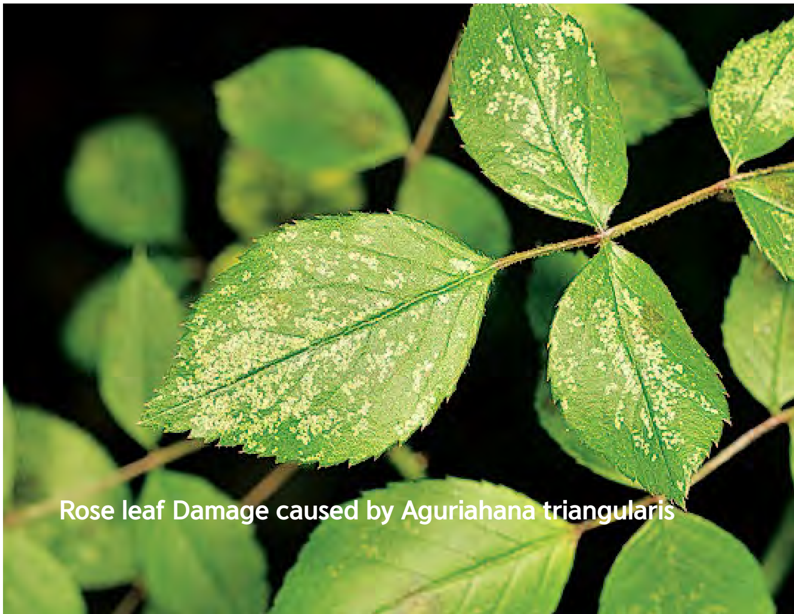
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Emergence photo of the Aguriahana triangularis


Late instar nymph of the Aguriahana triangularis




Early instar nymph of the Aguriahana triangularis


Rose leaf Damage caused by Aguriahana triangularis

Rice green leafhopper

Nephotettix cincticeps

Description

The body length is 4~5mm for males and 6mm for females. The color of the body is bright green on the back, and the head changes from yellowish-green to yellow and is glossy. The tip of the body is black in males and light yellow in females. There is a black horizontal band connecting both compound eyes on the back of the ocellus (simple eye). The grayish-yellow ocellus is located in front of the head's edge, and the compound eyes are blackish brown.

Life cycle

They occurs 4-5 times a year, and their eggs are a long oval, about 1㎜ long. The fourth instar nymph overwinters in rice fields, paddy banks, and leaves. It moves to short awn passes through the first generation in early spring, and then the adult insects fly to a garden bed or rice paddy, causing damage. The wintered adult generation begins to spawn from late April to early May. The first generation becomes an adult in early and mid-June, and the second generation travels to the main paddy field.

The egg period is about 16-20 days, the wintering nymph period is about 150 days, and the average spawning period of adult insects is 30 days, and the number of eggs is 150-500. It is easily observable in the rice paddy along with White-backed planthopper (Sogatella furcifera) and small brown planthopper (Laodelphax striatellus).

Damage

Adult insects and nymphs suck on the sap (fluid) of rice and cause damage and transmit dwarf disease (Candidatus Phytoplasma asteris), especially during the outflow season, they suck on the rice ear's sap causing soot disease from the pest's excrement.
(National Crop Pest Management System/NCPMS)

JADAM Natural Control Ratio

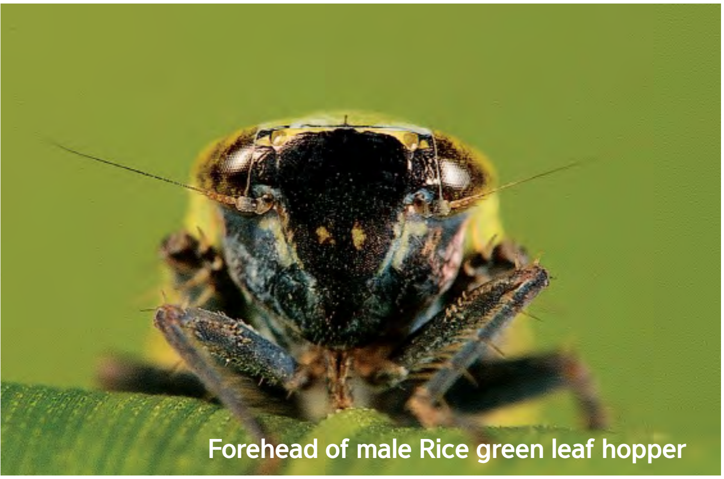
Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	7days	**Visible effect**	1~2days

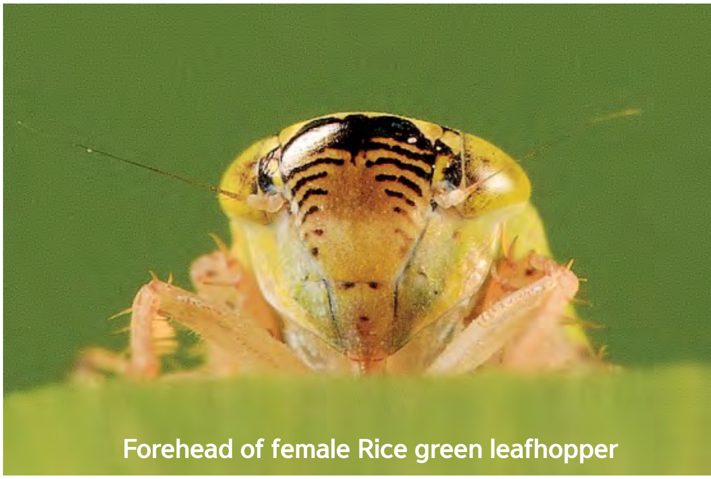
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

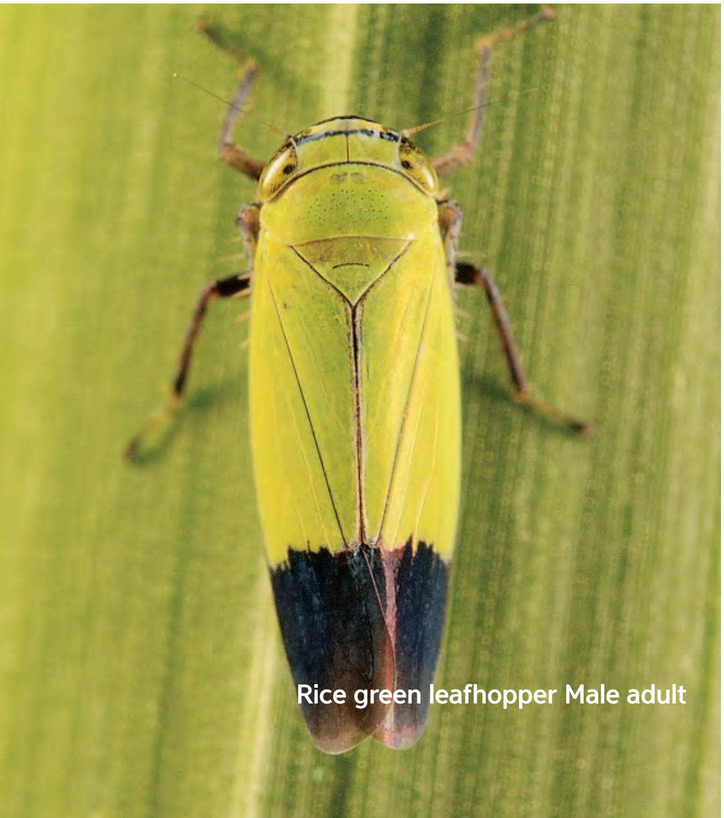
20L = 5.3gal, 100g=3.4oz



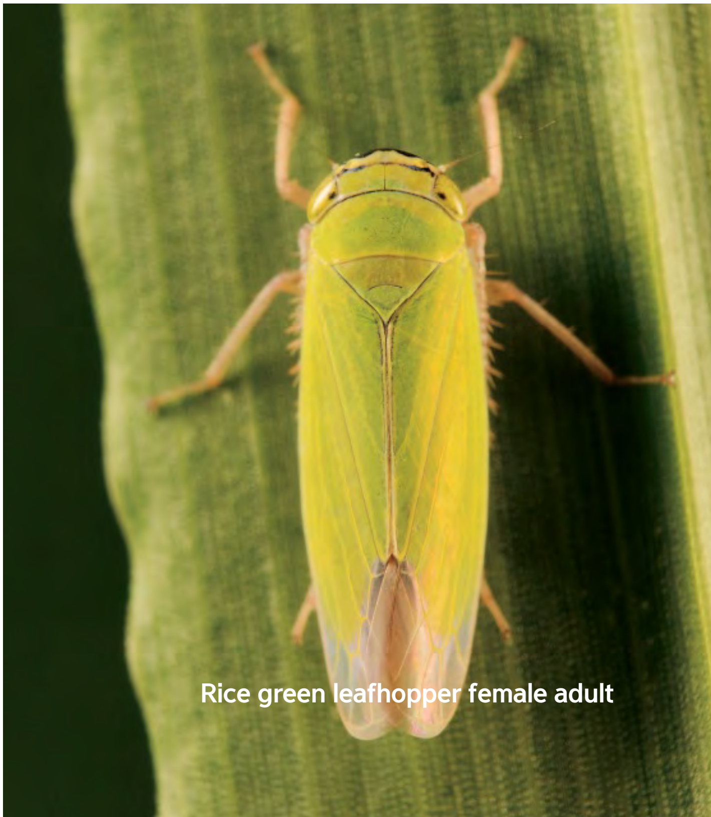
Forehead of male Rice green leaf hopper



Forehead of female Rice green leafhopper



Rice green leafhopper Male adult



Rice green leafhopper female adult

Spotted lanternfly

Lycorma delicatula

Description

Female adult insects have a red pattern on the abdomen, the size is around 15㎜, and the female is a little larger, the wingspan is about 30 ~ 40㎜, the fore and hind wings are opaque and light gray, and the black dot pattern is developed on 2/3rds of the anterior of the wing, and the inside of the hind wing is scarlet or red.

The first to third instar nymph has a black body and white spots on its legs. The fourth instar nymph has a red body and a distinct wing model. There are many white spots on the body and legs of the nymph. The nymph's first instar length is -3.6 to 4.4 ㎜, the second instar is -5.1 to 6.4 mm, the third instar is -6.9 to 9.4 mm, and the fourth instar is -10.9 to 14.8 ㎜ in length.

Life cycle

They occur once a year, and adult insects spawn anywhere, even tree trunks and cement poles, wherever rain can be avoided. They overwinter as eggs, and spawns 30-50 eggs in piles. Overwintered eggs start to hatch from the end of April, and most of the eggs hatch in early June. The nymph grows by sucking the sap (fluid/juice) from the grape leaves and stems and becomes an adult after the end of July. They molt after the fourth instar stage.

Adult insects live by sucking sap from the trunk of a tree, and after mating at the end of September, they spawn wintering eggs. The optimal growth temperature is about 8℃, and the effective temperature is about 355DD. Furthermore, the elongated eggs are covered with a protective material.

Damage

The nymph and adult insects suck the sap of grapes, jujubes, pears, peaches, plums, persimmons, and apricots stems, the nymph and adult insects suck the juice from the stems damagaing growth, and the excrement causes soot disease on the fruit, which reduces the value of the product.

(National Crop Pest Management System/NCPMS)

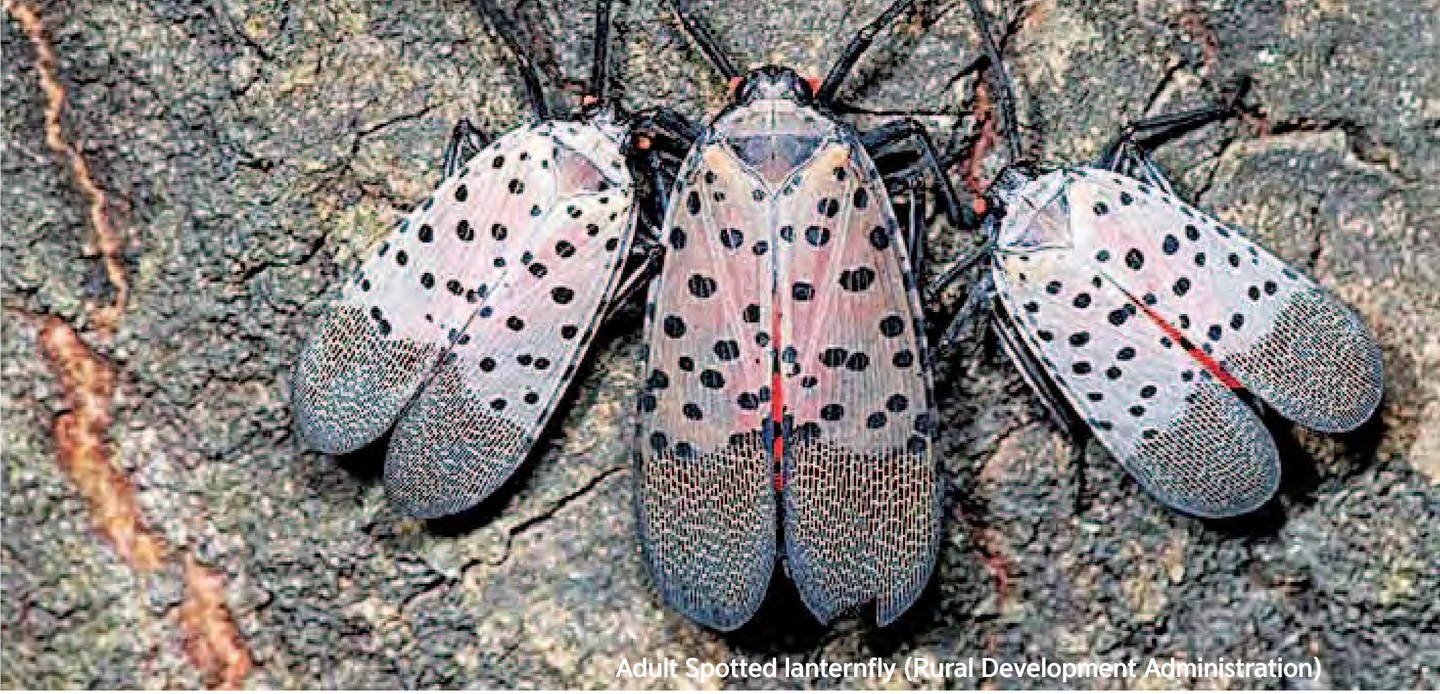
JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS	600ml	500ml	600ml
JMS			
NaOH	60g		40g
Fine soil	80g		40g
Control interval	10days	**Visible effect**	1~2days

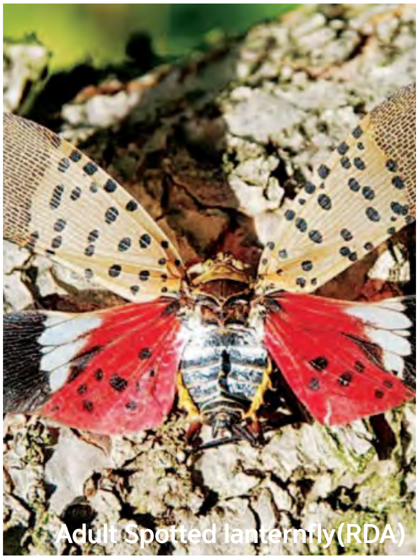
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- This pest flies away when spraying pesticides and then comes back. For complete control, it is recommended to control 2-3 times at intervals of 1 to 2 days.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

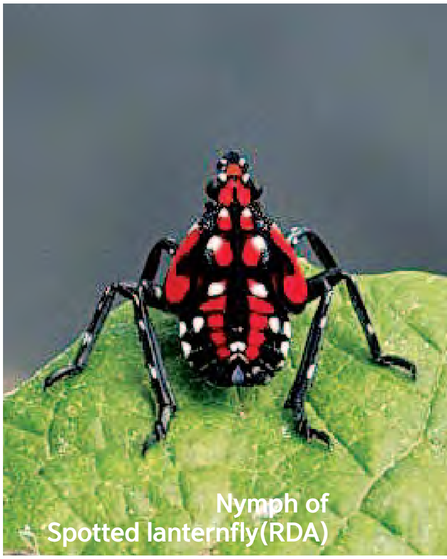


Adult Spotted lanternfly (Rural Development Administration)

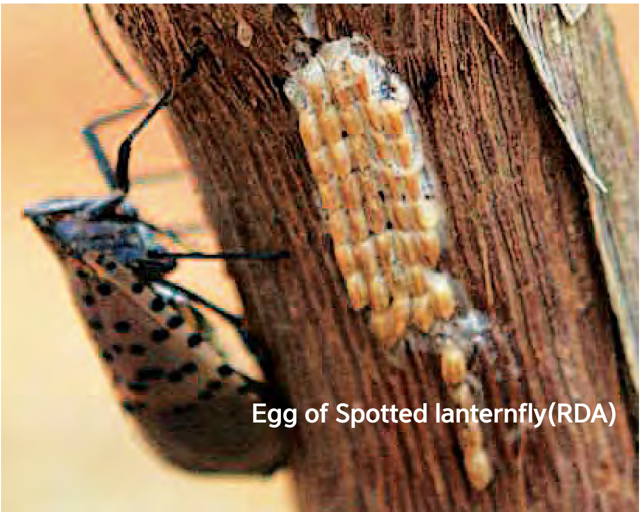
Adult Spotted lanternfly(RDA)



Adult Spotted lanternfly(RDA)



Nymph of
Spotted lanternfly(RDA)



Egg of Spotted lanternfly(RDA)

Adult Spotted lanternfly(RDA).

Brown planthopper

Nilaparvata lugens

Description

The body length (including wings) of an adult insect is 4.5-5.0mm for long wing and 3.3mm short wing. The body and head are dark brown. Compound eyes are black, ocellus (simple eye) are dark brown, and antennae are glossy dark brown. The nymph is milky right after hatching, but the upper part gradually turns light brown to blackish brown.

Life cycle

The flying season of Brown planthoppers is from the end of June to the end of July. Brown planthoppers, which begin flying at the end of June, can have 3 generations. However, the pest that begins flying in July can only have 2 generations. There are long wing and short wing types, and all flying generations are long-sized, and most of the long-winged planthopper will become short after proliferating the first generation. The incidence density is highest in September.

The development period of each type varies depending on the environment, but between June and September, the period from egg to adult is 24 to 34 days, the lifespan of adult insects is 20 to 30 days, and the egg period is 6 to 10 days. Eggs are laid in a pile of 7 to 10 eggs per leaf. The general number of spawning per one insect is about 300 eggs.

Damage

Adults and nymphs inhabit the lower part of the rice paddy, and they suck and gnaw the rice stalks to damage them. The damaged leaf sheath turns yellow, the height becomes shorter, and the productivity of grain decreases. the damaged ear turns brown and becomes more fragrant. In severe cases, the rice will dry out completely.

(National Crop Pest Management System/NCPMS

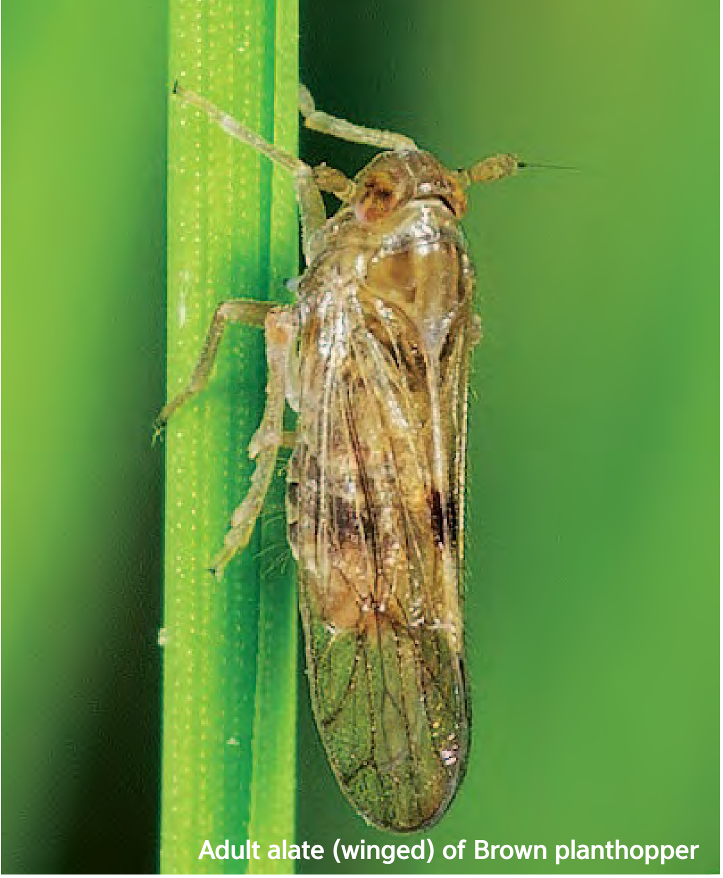
Refer to pages 25, 35~37

JADAM Natural Control Ratio

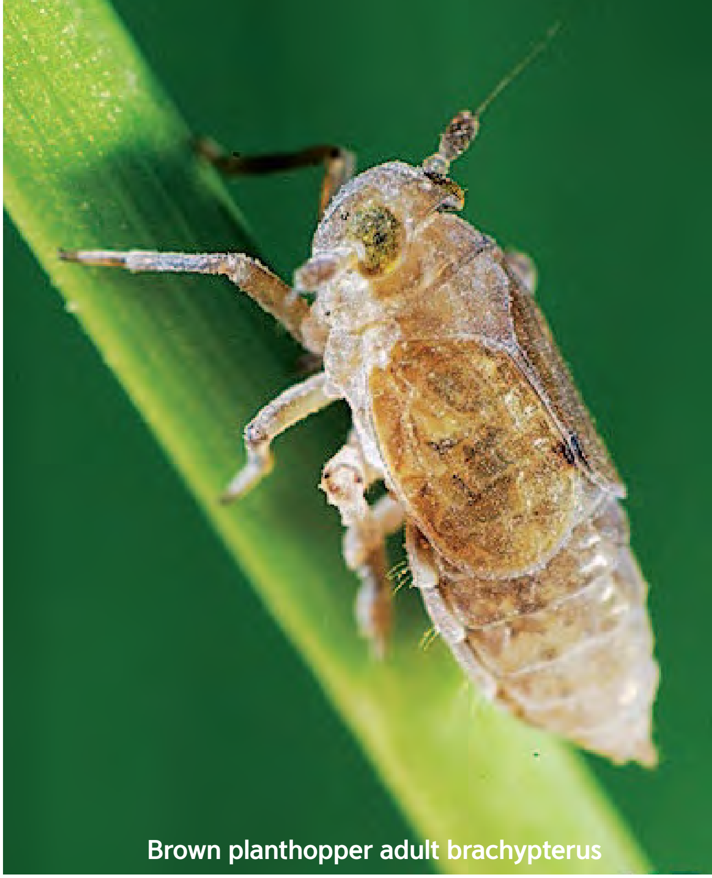
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

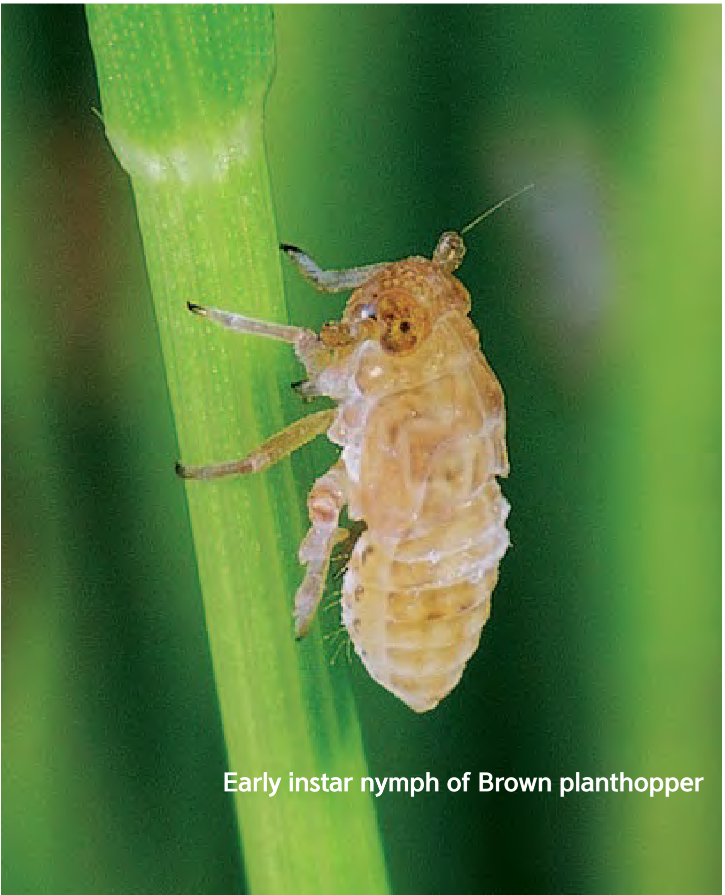
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



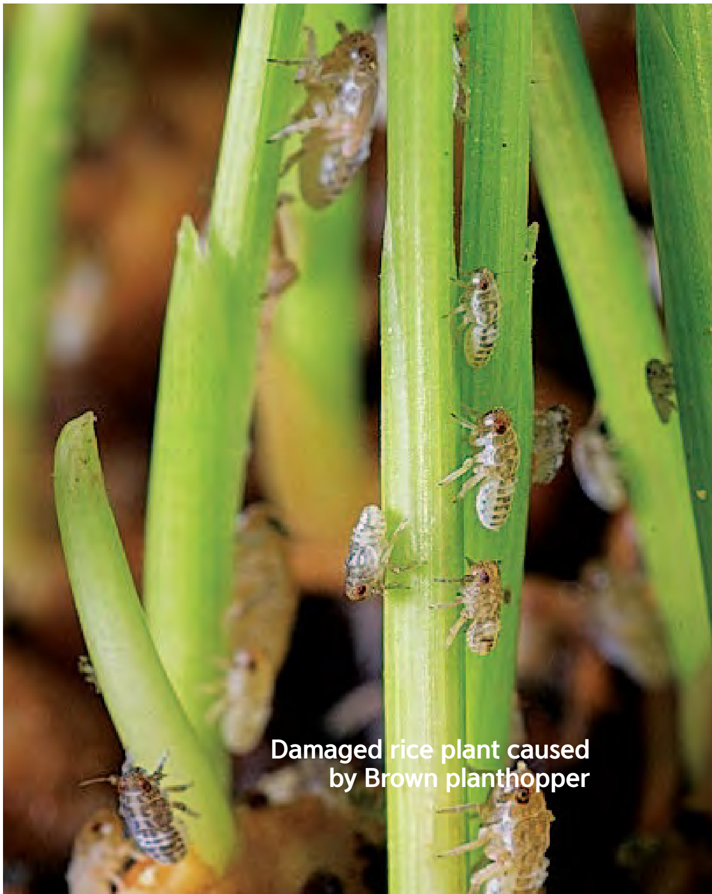
Adult alate (winged) of Brown planthopper



Brown planthopper adult brachypterus



Early instar nymph of Brown planthopper



Damaged rice plant caused by Brown planthopper

Small brown planthopper

Laodelphax striatellus

Description

The adult body length is 3.5mm for long-sized males and 4mm for females, and 2.3mm for short-sized males, and 2.5mm for females. The body is pale yellow with black spots. The head is pale yellow, the compound eyes are mostly black, but there is also some red, the ocellus (simple eye) is dark red, and the antennae is pale yellow. The front thorax is pale yellow, and there are 3 rows of thin ridges in the middle.

Life cycle

Small brown planthoppers are third to fourth-instar nymphs in the subtropic region and overwinter in plants and weeds such as paddy stumps, rice paddy fields, and many more. The egg period is 7-10 days, the nymph period is 18-20 days, the adult insect period is 20-25 days, and the pre-laying period is 7 days, and about 400 eggs are laid in each coleoptile. They occurs five times a year, and wintering insects move to the barley fields by the end of March while the first generation of adult insects move to the seedling or the paddy field. When first-generation adult insects migrate, late May to early June is when rice is highly susceptible to viruses. The second and third generations occur in mid-July and mid-August, where they begin damaging rice paddy fields. The last generation occurs between late September and early October when the rice is ripe.

Damage

Adult Small brown planthoppers and their nymphs can cause direct damage by puncturing rice stalks and sucking the plant's sap. The result of this causes rice stripe virus or Rice blackstreaked dwarf virus, which impacts the crop directly within a short time. The damaged crop will dry out, turn yellowish-brown, or are hardly fruitful even if it is alive.
(National Crop Pest Management System/NCPMS)

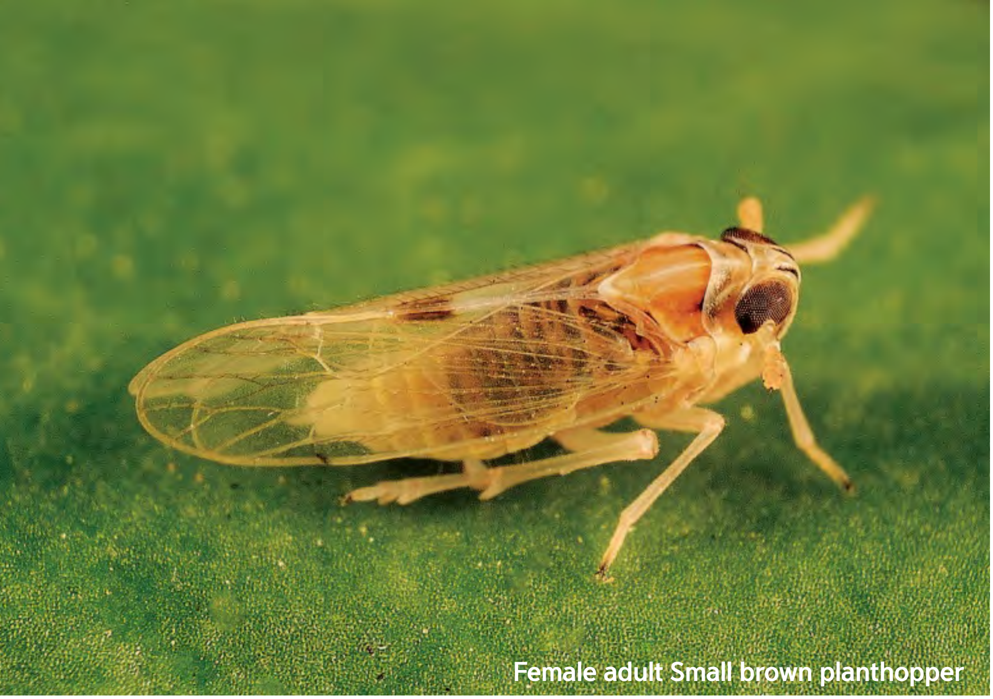
Refer to pages 25, 35~37

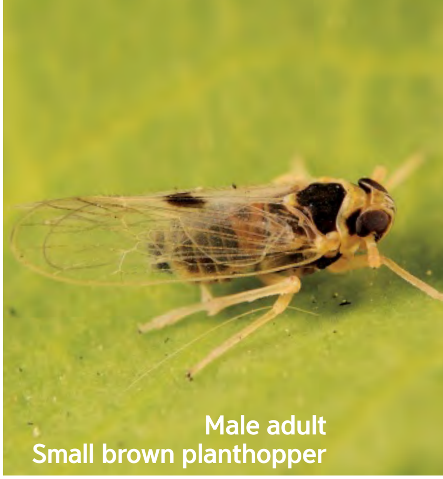
JADAM Natural Control Ratio

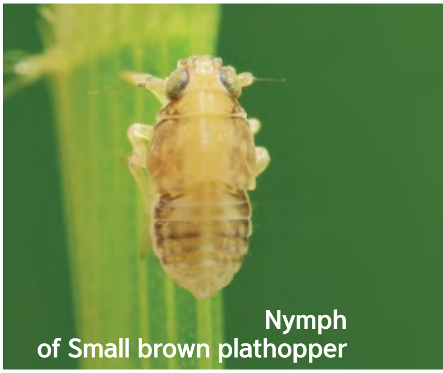
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH			40g
Fine soil		40g	40g
Control interval	10days	Visible effect	1~2days

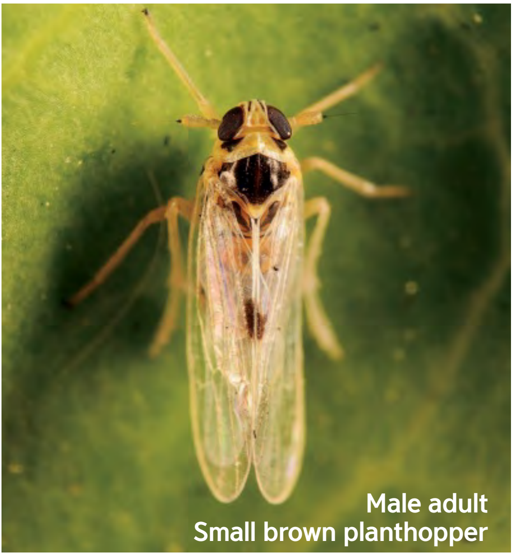
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.

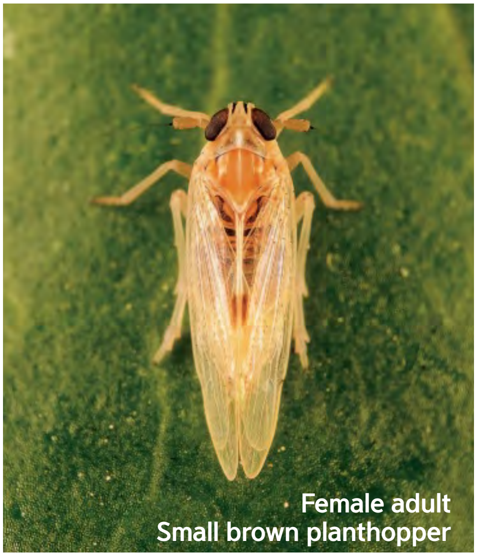
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

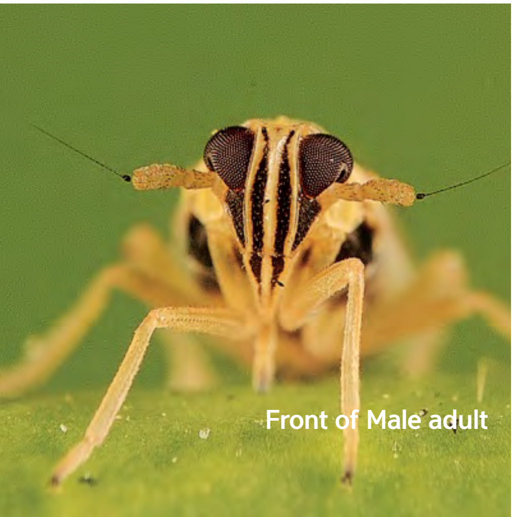

Female adult Small brown planthopper

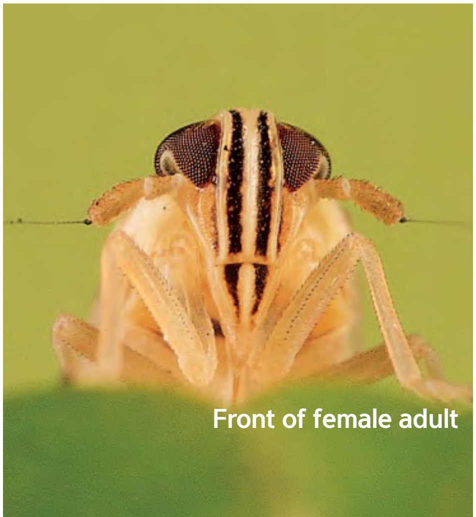

Male adult
Small brown planthopper

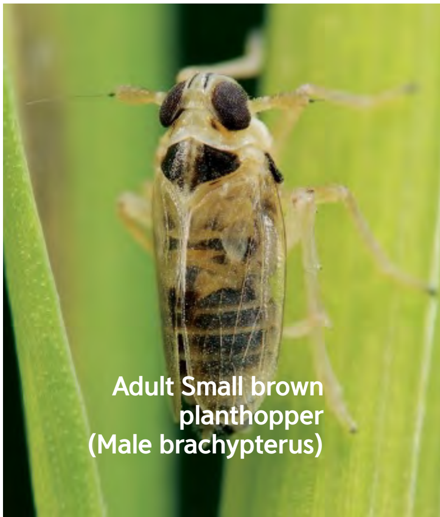

Nymph
of Small brown plathopper


Male adult
Small brown planthopper


Female adult
Small brown planthopper


Front of Male adult


Front of female adult


Adult Small brown
planthopper
(Male brachypterus)

Grape leafhopper

Arboridia kakogawana

Description

Adults are about 3mm long and light yellow. They have two black dots on each side of their forehead.

Life cycle

In the past, it was known that the Grape leafhopper that mainly occurs in grapes is the Arboridia apicalis. However, according to recent survey results, three kinds of nymphs infect grapes: Grape leafhopper (Arboridia kakogawana), A. maculifrons, A. ni-grigena. and Grape leafhopper is most common species among these three.

Damage

The nymphs and adult insects suck the sap from the leaves and fruits of the vine. When propagated on behind of a leaf, the leaf loses chlorophyll and turns white, and photosynthetic ability decreases, resulting in poor coloration and fruit maturation. When this occurs, it causes soot disease on the fruit and dramatically reduces the product's value. (Nongsaro)

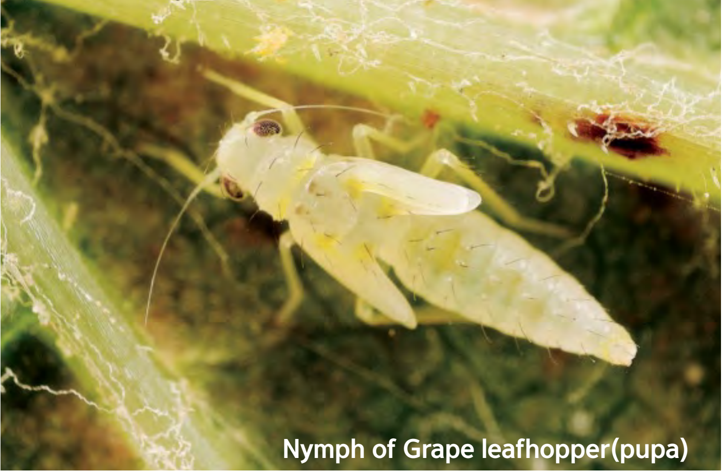
Refer to pages 25, 35~37

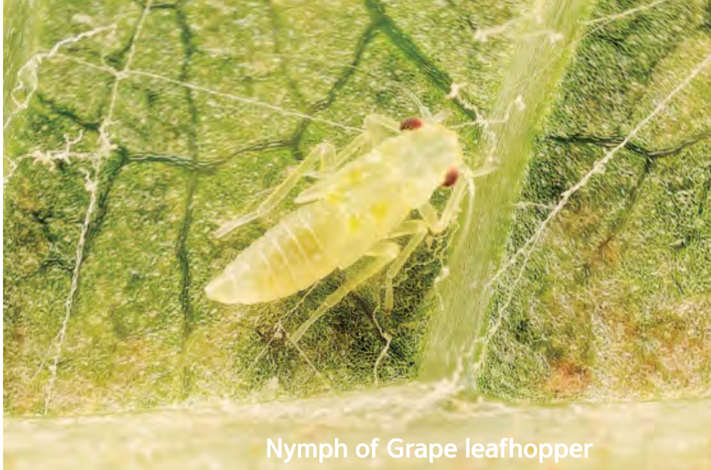
JADAM Natural Control Ratio

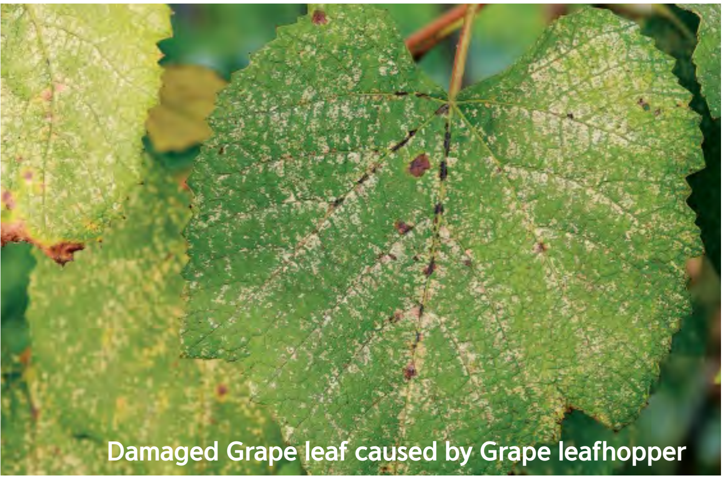
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH			40g
Fine soil		40g	40g
Control interval	10days	**Visible effect**	1~2days

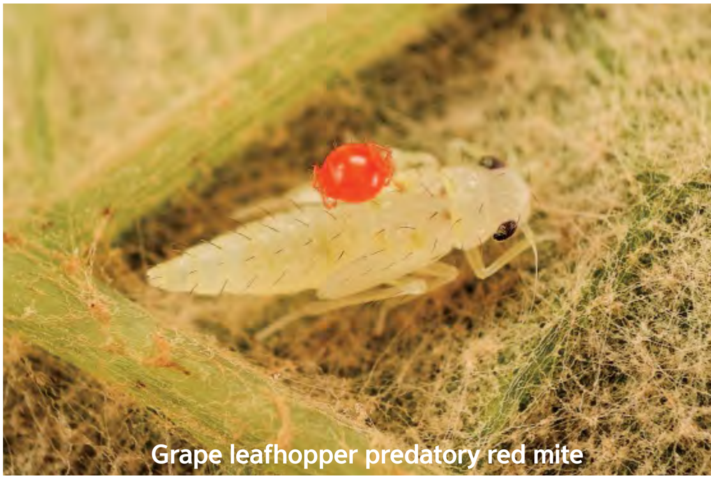
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

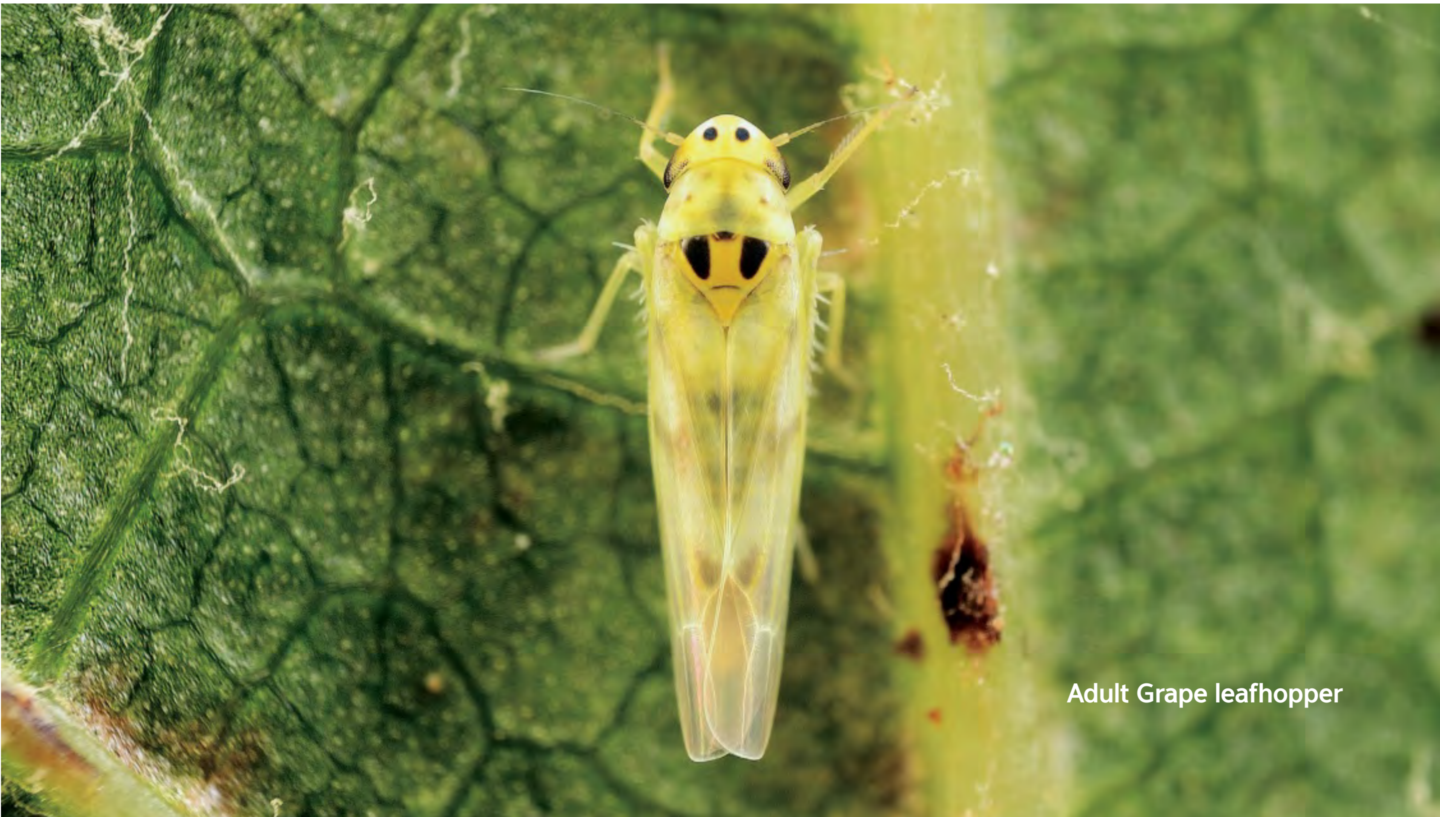
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Nymph of Grape leafhopper(pupa)


Nymph of Grape leafhopper


Damaged Grape leaf caused by Grape leafhopper


Grape leafhopper predatory red mite


Adult Grape leafhopper

White backed rice planthopper

Sogatella furcifera

Description

The length (including wings) of adult insects is about 4 to 4.5 mm long and 2.5 mm long. The body is light yellow, and the female is thinner than the male.

The protruded head reaches 1.5 times the width, and the central part of the mesoscutum is long hexagonal, yellowish-white, and black on both sides. The central part of the dorsal scutellum has a white rhombus shape. The nymph is milky white or blackish brown, and the center of the third and fourth segments has a large white pattern in appearance, and a lot of white beeswax powder is attached to the membrane between the segments.

Life cycle

The frequency of flying is 10 times higher than on the rice plant in the subtropic region, but the damage is not significant because it is not concentrated.

The life cycle of the first generation at 25℃ is about 24 days, and the period before spawning is 4.6 days, the egg period is 7.6 days, and the larvae period is 13 days. In outdoor temperatures between June and August, one generation passes in 20 to 30 days. The lifespan of adult insects is 15.6 days, the number of eggs is about 250, and the eggs are laid in piles on the weeds. The next generation nymph has the highest density, and a short form appears. In places where transplanting is fast, the density is high due to many flying early. In late-planted paddy fields, the density is highest from early to mid-August.

Damage

The flying adult insect produces larvae damage cause sluggish initial growth and leaf discoloration. Unlike Brown planthopper, the damage is evenly seen throughout the plant because they aren't concentrated in a single area.

(National Crop Pest Management System/NCPMS)

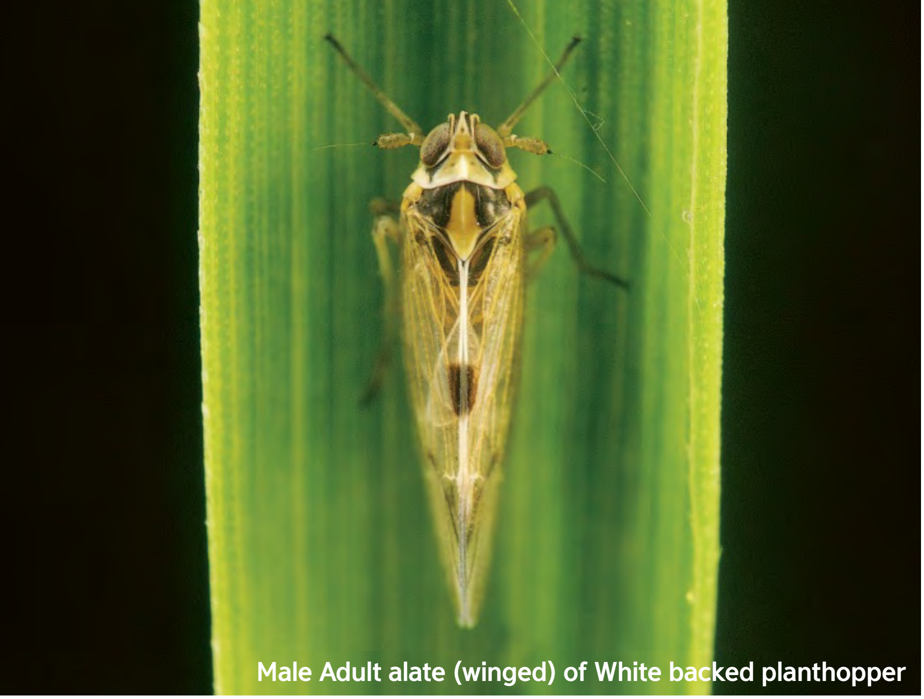
Refer to pages 25, 35~37

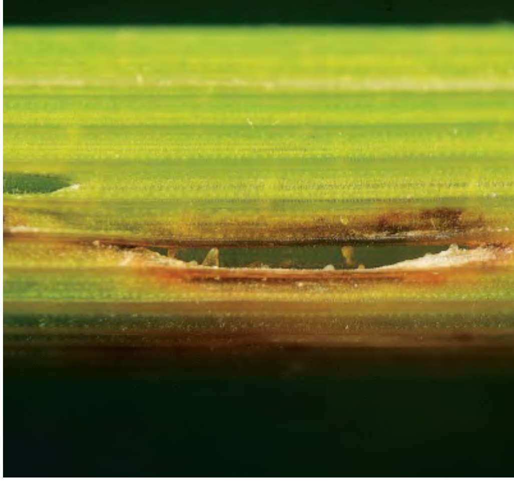
JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS		400ml	500ml
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	1~2days

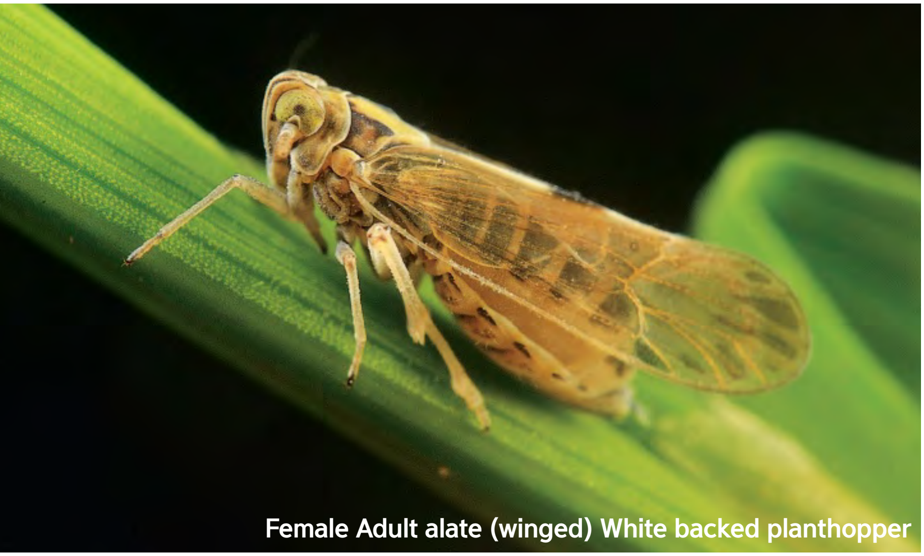
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

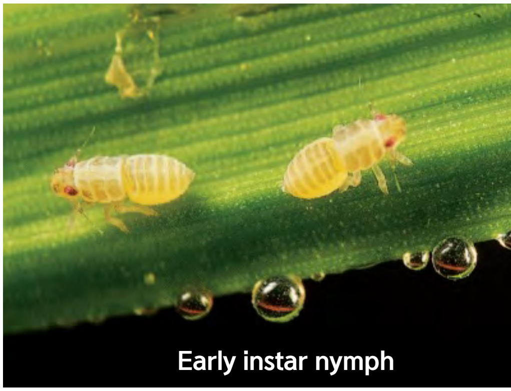
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

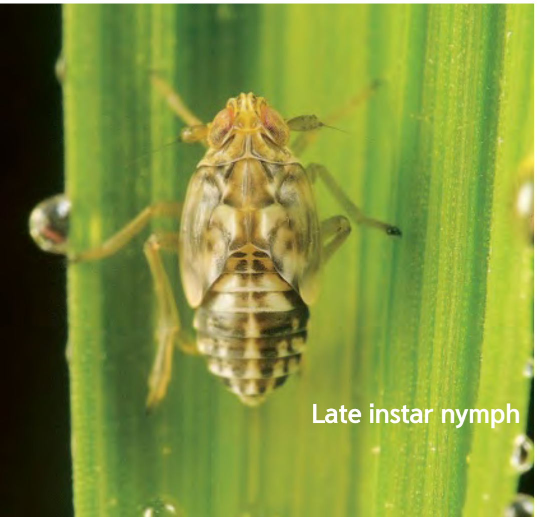

Male Adult alate (winged) of White backed planthopper

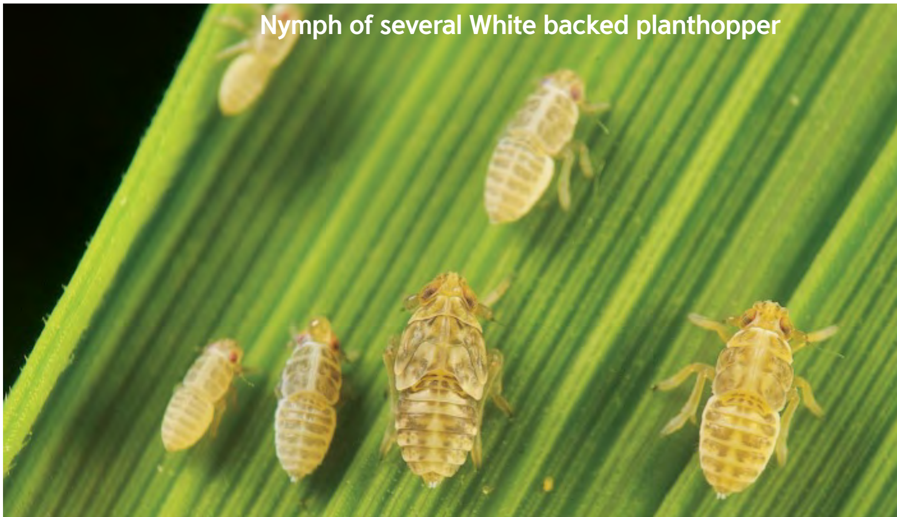


Damage caused
by Whitebacked planthopper


Female Adult alate (winged) White backed planthopper


Early instar nymph


Late instar nymph


Nymph of several White backed planthopper

Maggot, Leaf Miner

There are various flies that we encounter in our daily life, whether in a city or in the countryside, from food waste to the dead body of an animal. Many are harmless but some fly species damage crops worse than others and leaf miners (Agromyzidae) are one of them. Leaf miners get their name from making holes in plants and fruit. When they find a host crop, they begin to dig a hole and don’t stop. However, this species is a bit different from the mole cricket. Leaf miners dig a hole in the fruit of a host crop, not the ground. Leaf miners gather on host plants that suit their tastes, make holes in the leaves, and spawn in the hole they made. The newly hatched leaf miner larvae start eating leaving behind a zigzag pattern of damage.

They mainly occurs in greenhouses, and there are various types such as American leaf miner, pea leaf miner, green leaf miner, chrysanthemum leaf miner, and tomato leaf miner. American leaf miners cause damage to crops such as gourds, eggplants, legumes, and cruciferous plants.

Watermelon, melon, melon, cucumber, pumpkin, cabbage, cabbage, radish, potato, pepper, eggplant, tomato, lettuce, garland chrysanthemum, celery, carrot, spinach, and other host plants are numerous, making them difficult to control. (Insects Who Loved Crops, August 5, 2011, Youngsik Han)

Onion maggot

Delia antiqua

Description

Adults are grayish-brown flies of 5~7mm, and the arrangement of setae in the center of the thorax's scutellum is sparse and irregular. Full-grown larvae are 8-10mm maggots with 11-12 pores. The pupa is 6~7mm long reddish-brown oval shape. Males and females are distinguishable by the shape of external genitalia at the tip of the abdomen or by the spacing of both compound eyes. Males have compound eyes close to each other, and female's eyes are spread further apart.

Life cycle

It occurs a lot in mono-crop fields. It occurs three times a year, and the optimum development period in the subtropic regions is mid-April, mid-June, and late September to early October. In some cases, it winters in a larval state depending on temperature. Adult insects lay eggs in the cracks of the leaves of the host plant or in the surrounding soil. The number of spawn is usually 50 to 70, the egg period is 3 to 4 day, and the larval period is 14 days.

In the hot summer season, July to August, they go dormant (aestivation) in the ground in a pupa state, and when the temperature decreases, they become adults and lay eggs in chives, onion beds, and garlic fields. When the plant's growth is sluggish or when the plant turns a brownish yellow color, it may be a clue it is an onion maggot infestation.

Damage

The larvae eat the roots of garlic, onions, green onions, leeks, lilies, and flowers while also causing the lower leaves to yellow, dry, and die. When the damaged crop is pulled out, the middle of the root is cut and the maggot-shaped larva can be easily observed.

(National Crop Pest Management System/NCPMS)

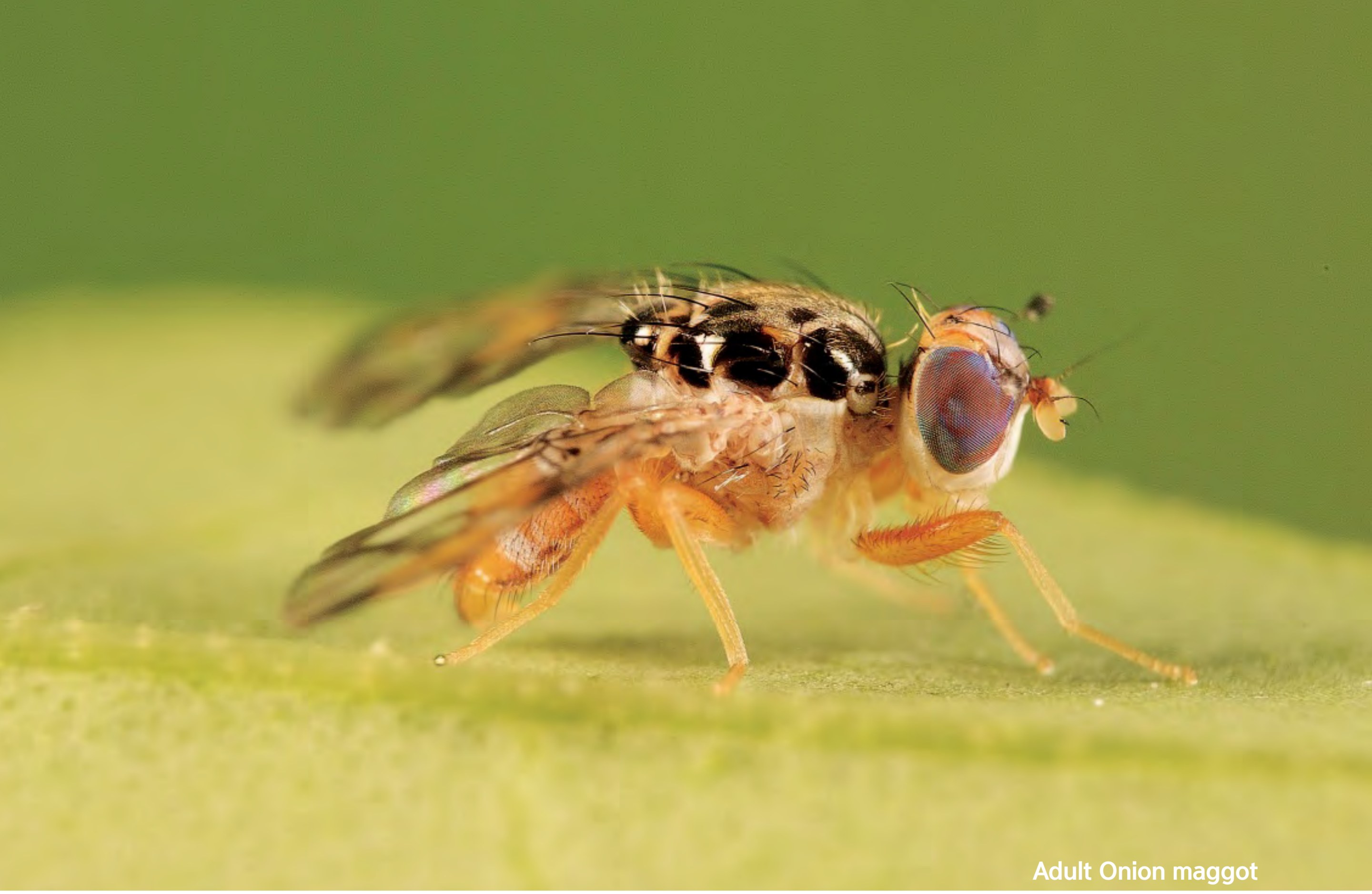
Refer to pages 25, 35~37

JADAM Natural Control Ratio

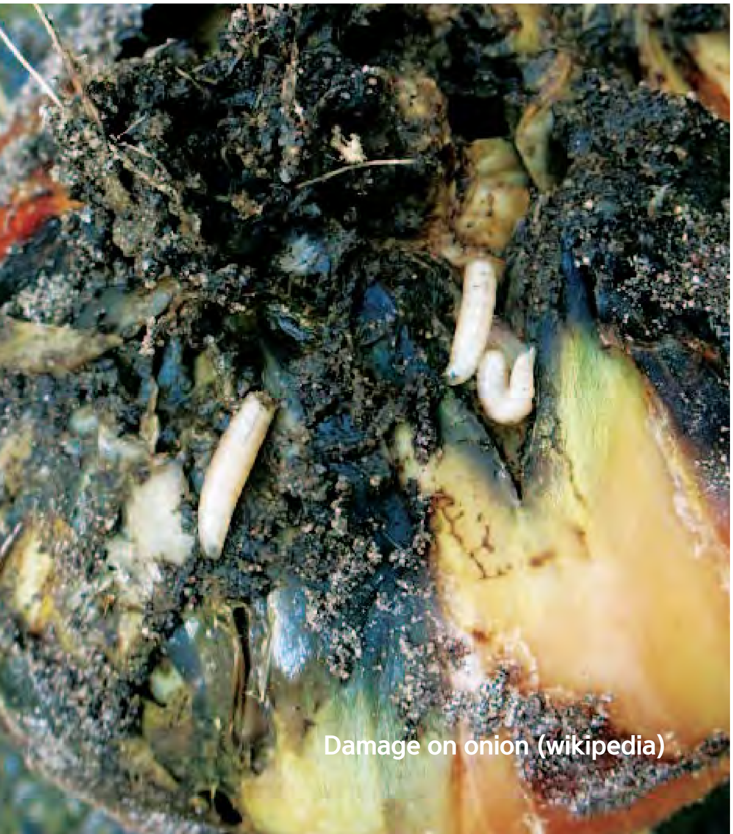
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	
JHS		400ml	
JMS	2000ml		
NaOH		40g	
Fine soil			
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- This pest is unlikely to occur when various microorganisms are increased in the soil. This can be prevented by using JMS frequently.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Onion maggot



Damage on onion (wikipedia)

Chrysanthemum gall midge

Diarthronomyia chrysanthemi

Description

Adults are in the form of flies, have skinny and long legs are orange and red with a 2 to 2.5 mm body length. Females spawn about 100 fine white eggs on chrysanthemum shoots. After 3-16 days, maggot-shaped larvae hatch from the egg, penetrate into the chrysanthemum tissue and damage it. It is found in Korea, Canada, the UK, Argentina, and Colombia.

Life cycle

Dissecting the lump under a microscope can reveal tiny maggots or pupae. In the hump, the larva grows and becomes a pupa. After emergence, the pupa's skin remains on the surface of the lump, and if you look closely, you can see a small hole in the tip of the lump. Most emergence takes place in the middle of the night and early morning. Emerged adult insects fly around, they are difficult to observe well around the affected leaves. It takes about 35 days to complete a generation. In greenhouse conditions, 5-6 generations can occur during the year. (Gangneung Agricultural Technology Center)

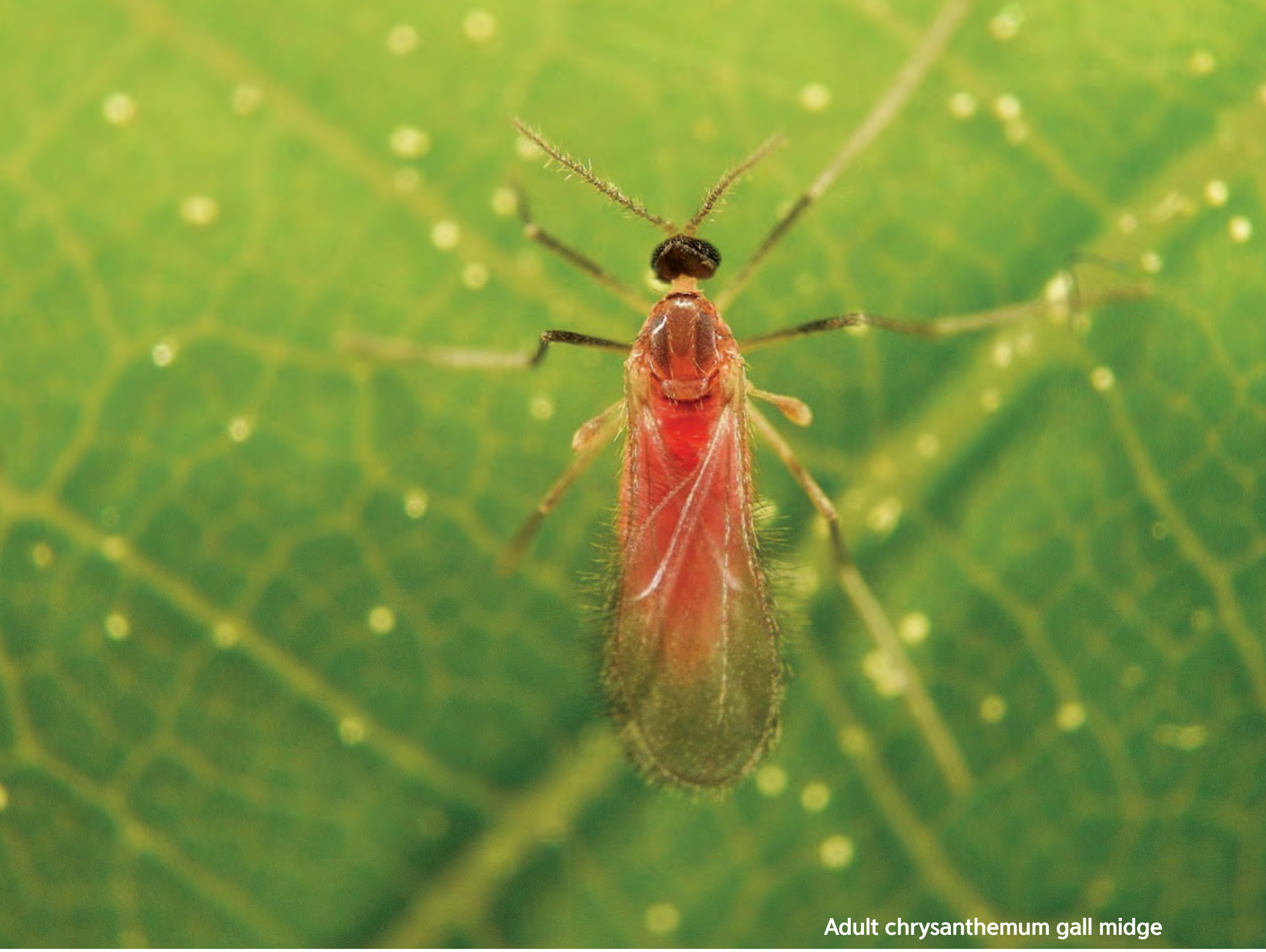
Refer to pages 25, 35~37

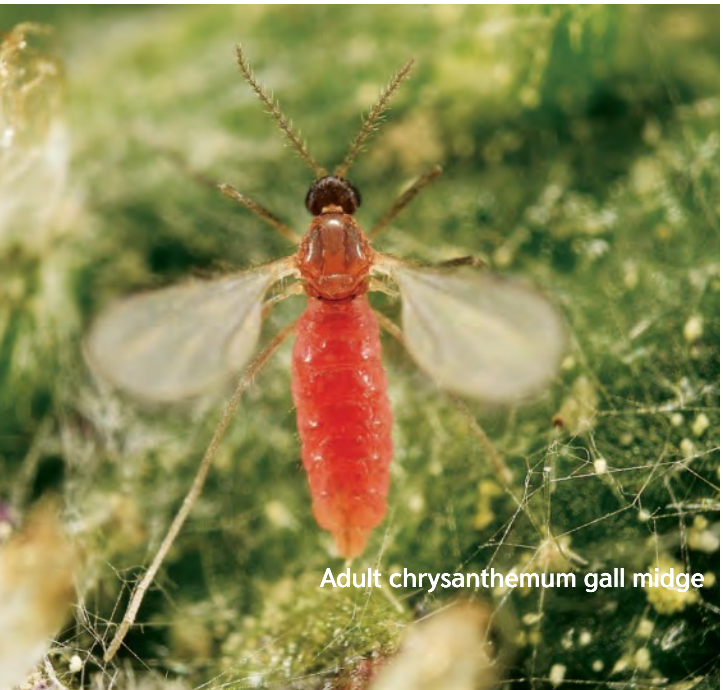
JADAM Natural Control Ratio

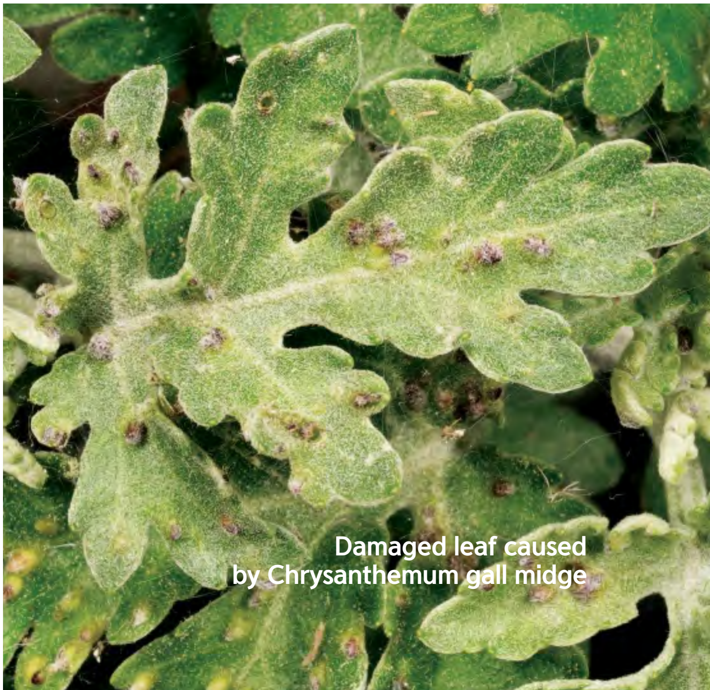
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	40g
Fine soil		60g	80g
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult chrysanthemum gall midge


Adult chrysanthemum gall midge


Damaged leaf caused by Chrysanthemum gall midge

Leaf miner

Liriomyza trifolii

Description

Leaf miner larvae are yellow maggot-shaped, their body length is 1.9-2.1 mm, and pupae are yellowish-brown 1.3-2.3 mm with a long oval shape. The adult is like a small fly with wings. Female adults are slightly larger than males and have well-developed ovipositor (spawning organ) at the tip of the abdomen. The body length is about 2~3㎜, the body color is a combination of yellow and black, and the scutellum is black. Eggs are slightly transparent with 0.2~0.3㎜ in size.

Life cycle

Adults spawn 300-400, and most of the eggs spawn on the front side of the leaf but sometimes spawn on the leaf's back. The growth period from egg to adult is 47~58 days at 15℃, 23~28 days at 20℃, 14~15 days at 25℃, and 11~13 days at 30℃. The growth period seems to be shortened depending on temperature. The eligible growth temperature is 7℃ for eggs, 8℃ for larvae, and 10℃ for pupa, and the maximum eligible growth temperature is estimated to be about 35℃. It is unclear whether or not they overwinter outdoors, but they can occur more than 15 times throughout the year in the greenhouse.

Damage

Larvae cause damage by piercing a meandering mine (tunnel) on the leaves, adult insects attach to the leaves and suck the juice or spawn on them, causing damage that leaves small spots on the leaves. Damage occurs in the asteraceae (chrysanthemum, lettuce), eggplant family (eggplant, tomato), gourd family (watermelon, cucumber, melon, pumpkin, melon), parsley family (celery), and barberry family (gerbera). The larvae cause damage by burrowing in the leaf flesh, and the damage traces appear white. The initial damage shape looks like a meandering path, but if severe, the whole leaf becomes brown and dies.

(National Crop Pest Management System/NCPMS)

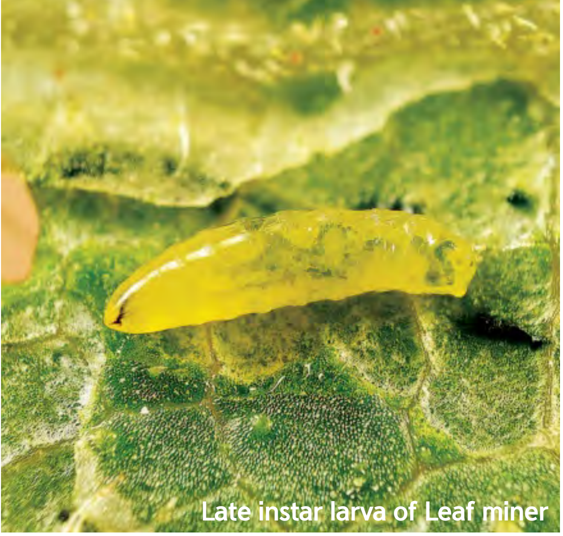
Refer to pages 25, 35~37

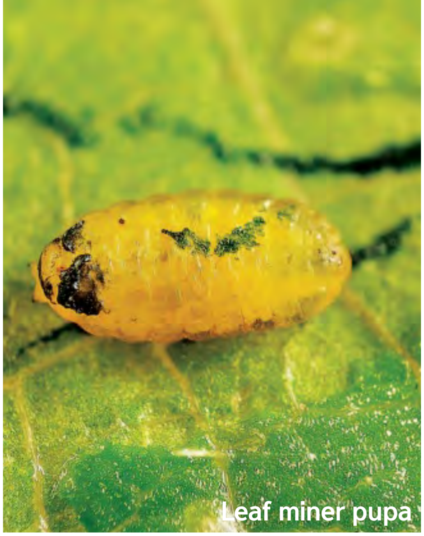
JADAM Natural Control Ratio

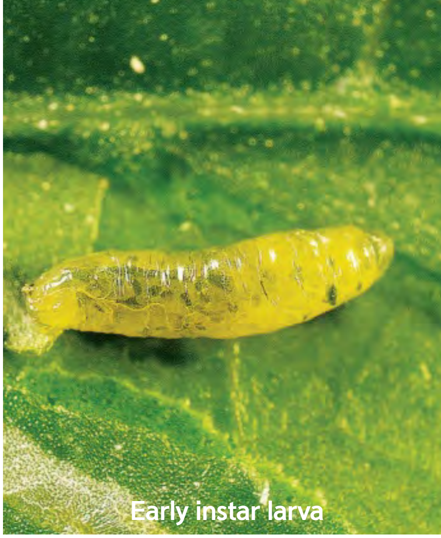
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	5days	Visible effect	1~2days

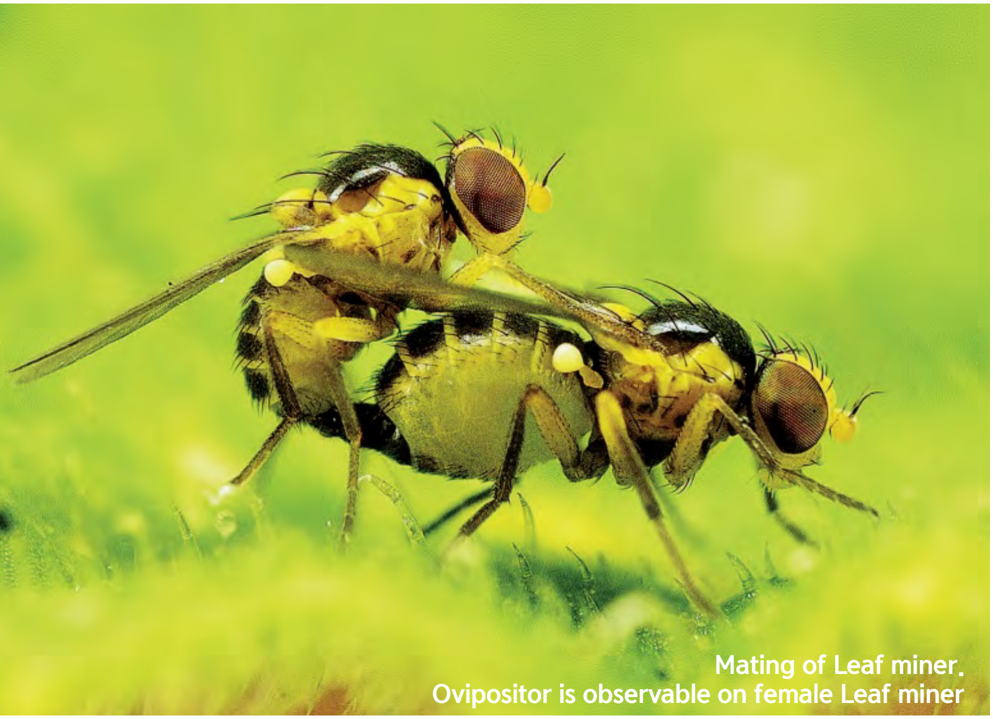
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

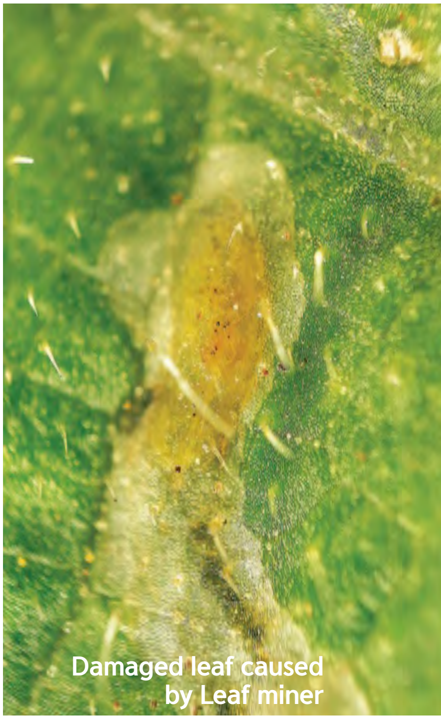
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

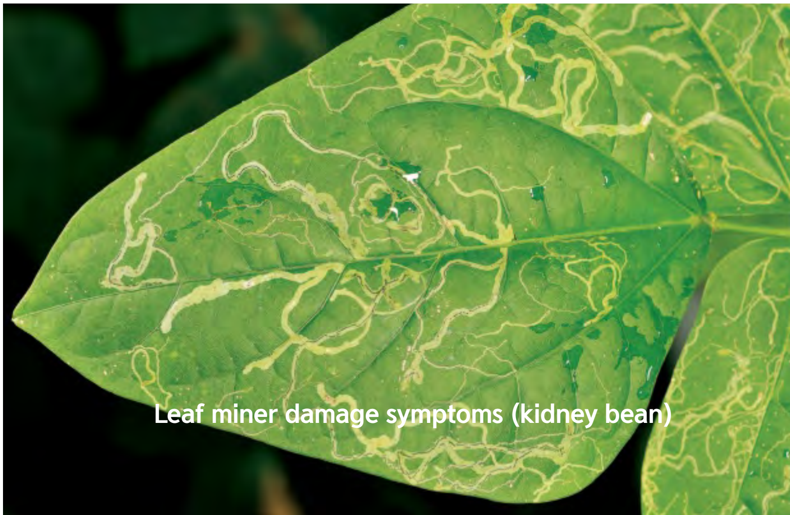

Late instar larva of Leaf miner


Leaf miner pupa


Early instar larva


Mating of Leaf miner.
Ovipositor is observable on female Leaf miner


Damaged leaf caused
by Leaf miner


Leaf miner damage symptoms (kidney bean)

Garden pea leaf miner

Chromatomya horticola

Description

Adult insects are small flies that spawn in mesophyll and occur several times a year. It is an omnivorous pest and harms various crops. Adults are 2mm in size, and larvae grow up to 3mm.

Damage

The larvae penetrate the mesophyll irregular burrow lines in the lobe, and the damaged area turns brown and dries. In greenhouses, gray mold disease occurs on the parts of plants that have died, scattered mold spores can cause secondary damage.
(Korea National Arboretum)

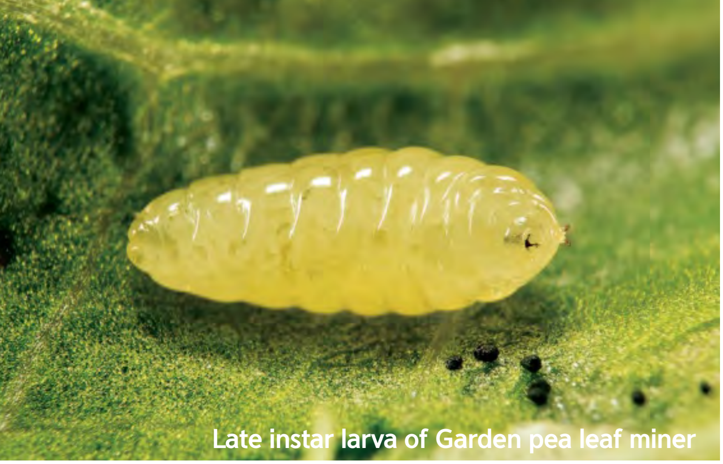
Refer to pages 25, 35~37

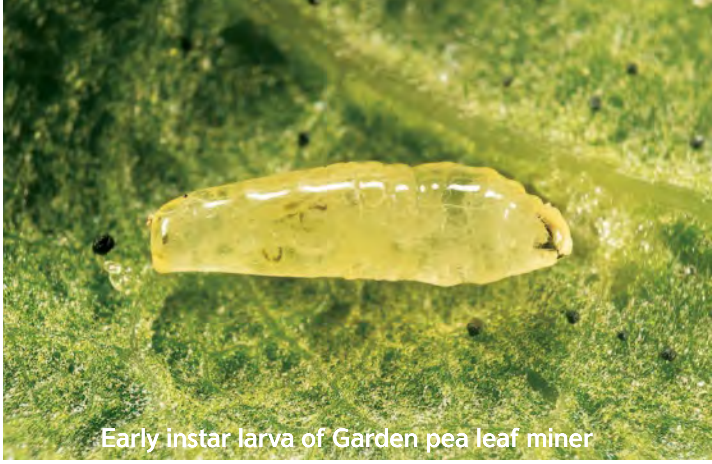
JADAM Natural Control Ratio

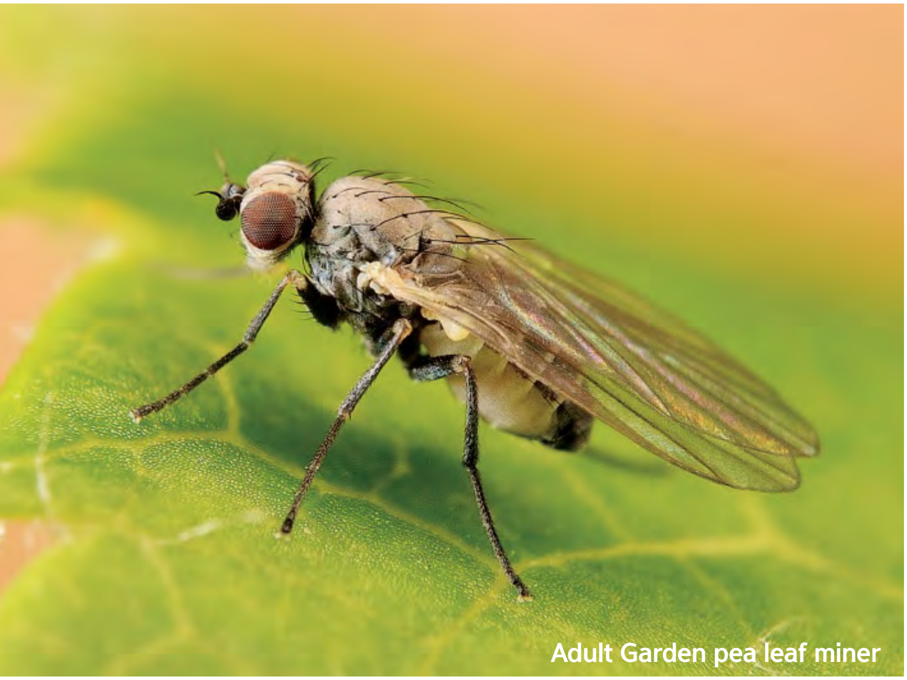
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	5days	Visible effect	1~2days

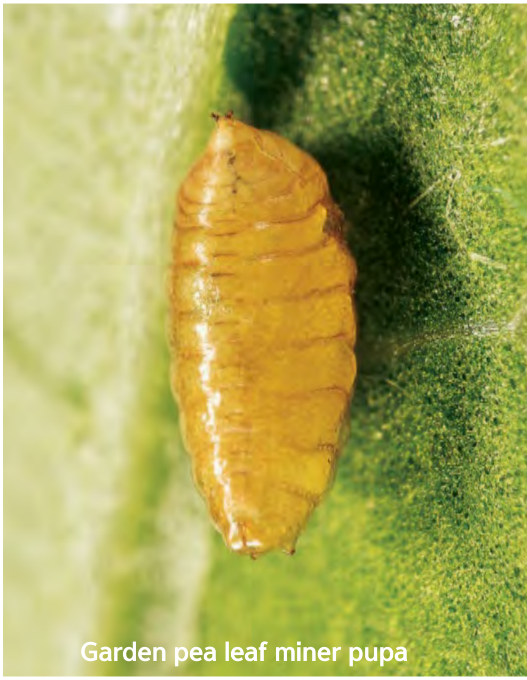
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

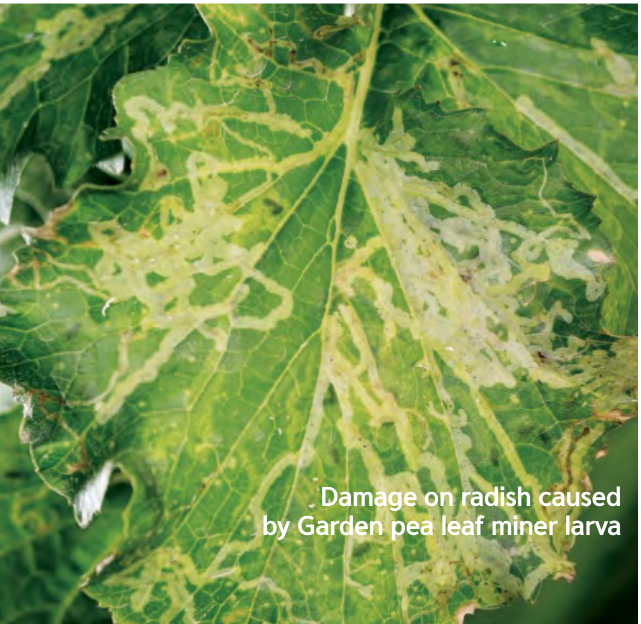
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

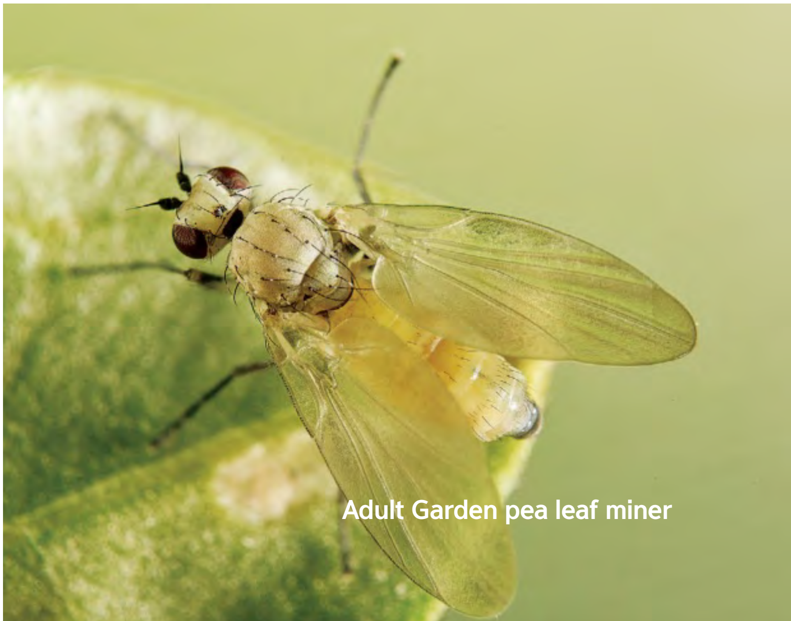

Late instar larva of Garden pea leaf miner


Early instar larva of Garden pea leaf miner


Adult Garden pea leaf miner


Garden pea leaf miner pupa


Damage on radish caused by Garden pea leaf miner larva


Adult Garden pea leaf miner

Spotted wing drosophila, Small fruit fly

Drosophilidae suzukii

Description

Like other members of the Drosophilidae, Fruit fly)is small, approximately 2 to 3.5 millimeters in length.

Life cycle

The lifespan of D. suzukii varies greatly between generations; from a few weeks to 10 months. Generations hatched early in the year have shorter lifespans than generations hatched after September. The fly has been observed reproducing on many other species of soft-skinned wild fruit.

Adults emerge from overwintering when temperatures reach approximately 10 °C. The fertilized female searches for ripe fruit, lands on the fruit, inserts its serrated ovipositor to pierce the skin and deposits a clutch of 1 to 3 eggs per insertion. Females will oviposit on many fruits and in regions of scarce fruit, many females will oviposit on the same fruit. In captivity in Japan, research shows up to 13 generations of D. suzukii may hatch per season. A female may lay as many as 300 eggs during its lifespan. With as many as 13 generations per season, and the ability for the female to lay up to 300 eggs each, the potential population size of D. suzukii is huge.

Damage

The economic impact of D. suzukii on fruit crops is negative and significantly affects a wide variety of summer fruit in the United States including cherries, blueberries, grapes, nectarines, pears, plums, pluots, peaches, raspberries, and strawberries. Economic losses have now been reported across North America and in Europe as the fly has spread to new areas. In 2015 it is estimated that national economic loss for producers in the United States was $700 million. Future losses may decrease as growers learn how to better control the pest, or may keep increasing as the fly continues to spread. (wikipedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

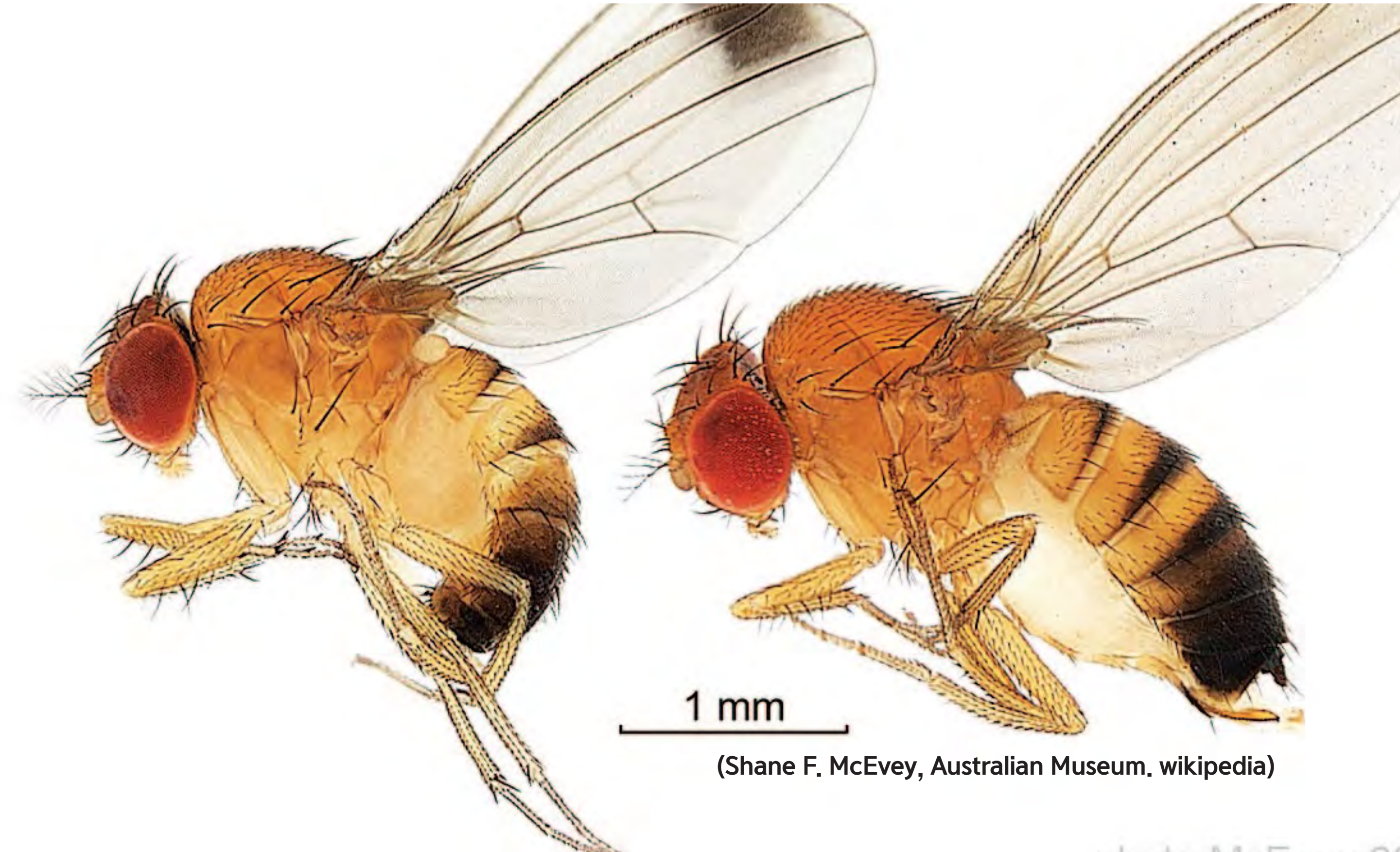
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH			40g
Fine soil		40g	60g
Control interval	5days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

Fruit fly spawned on cherry fruit
(Martin Hauser Phycus, wikipedia)

(Judy Gallagher, wikipedia)



(Shane F. McEvey, Australian Museum, wikipedia)

Onion miner

Liriomyza chinensis

Description

Adults are gray-white flies, about 2mm in length, yellow on both sides and legs of the body, and black on the thorax and abdomen. The larvae are tiny yellowish-white maggots that are 4mm in size when fully grown.

Life cycle

It occurs 4-5 times a year and winters as a pupa in the ground. Adult insects spawn in the leaf tissue of green onions from April to May. The hatched larvae damage leaves and then enter the ground to become a pupa. The incidence of adult insects is small in midsummer and gradually increases its number in late spring and early autumn.

The peak period of occurrence is in early July, early August, and late September. It pierces into the green onion therefore, it is easy to observe the damage with the naked eye.

Damage

The larva dig burrows in the green onion leaves and create an irregular white line of tunnels. In most cases, the young green onions may dry out. In seedlings, larvae parasitize on the sheath causing fatal damage.

Growing onions do not die, but the quality of the leaves deteriorates, resulting in poor growth. Full-grown larvae break through the leaves' epidermis and fall to the ground, becoming a pupa in the soil. The damage is severe in the subtropic region from summer to autumn.

(National Crop Pest Management System/NCPMS)

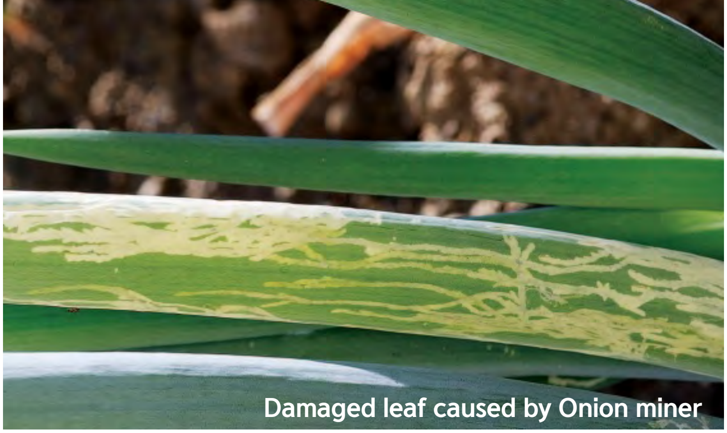
Refer to pages 25, 35~37

JADAM Natural Control Ratio

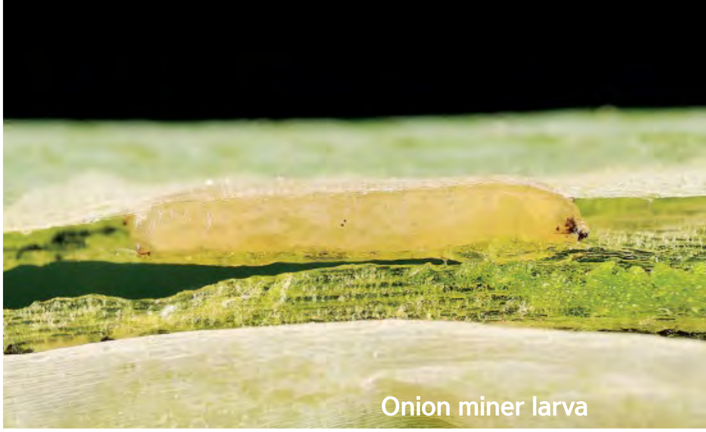
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

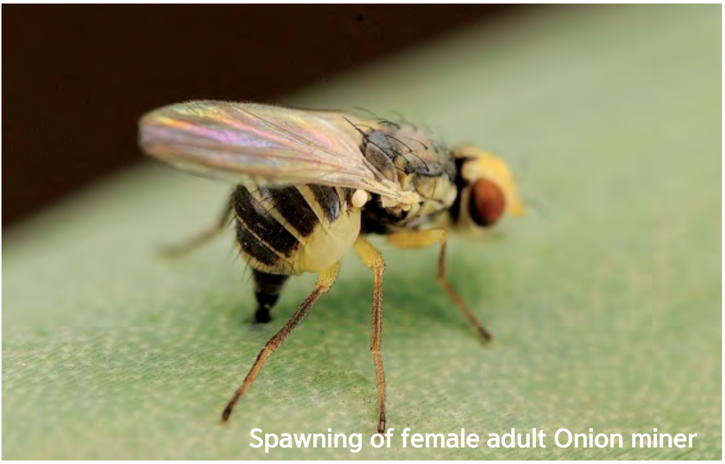
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



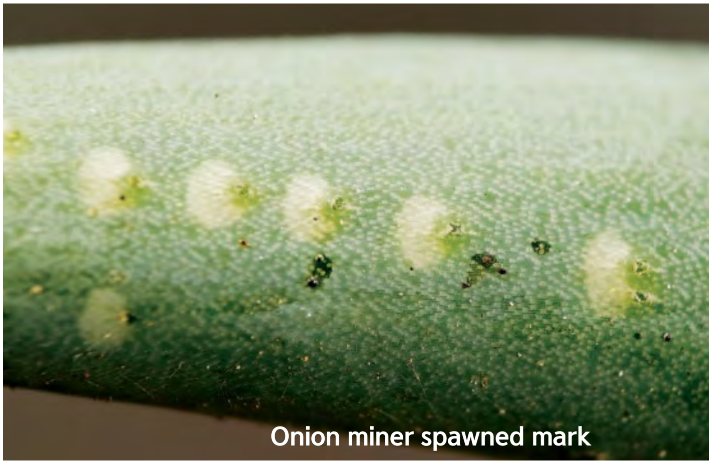
Damaged leaf caused by Onion miner



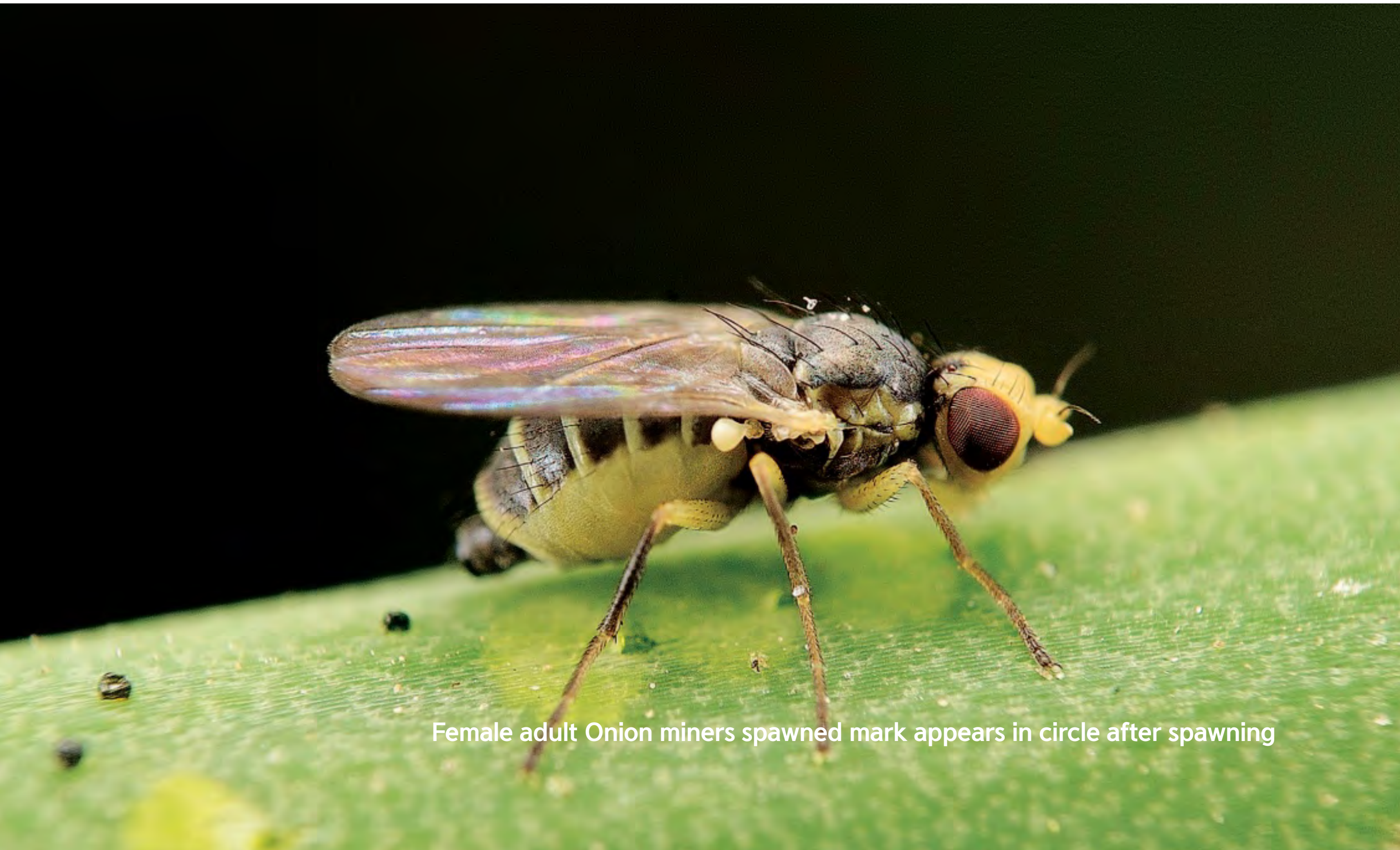
Onion miner larva



Spawning of female adult Onion miner



Onion miner spawned mark



Female adult Onion miners spawned mark appears in circle after spawning

Beetle, Bug

Beetles are the group of insects that is the largest in size of all insects. Around 300,000 species are known, and they are found all over the world except the polar regions.

As there are many beetle species with different shapes, sizes, and colors. The smallest one is the carpet beetles whose length is around 0.25mm, and the largest beetle is the Hercules beetles which are around 15.5cm (include its horn). There are round, ball-shaped, elongated cylindrical, plate-shaped, or vial-shaped beetles. The colors of beetles are black, yellowish-brown, and reddish-brown as well as gold.

A major characteristic of beetles is that the fore wings are thick and hard. Elytron or wings are usually combined in the midline of the abdomen side. They have big jaws that are well developed for chewing.

Beetle’s antenna (tactile sensor) come in many shapes depending on the species and are used for courtship behavior or fights between males. Compound eyes are well developed, but some species do not have stemma. The front thorax is big and does not stick to the back body when it moves. But, the middle and rear thorax are connected and cannot move.
(Doosan Encyclopedia)

Chrysanthemum lace bug

Corythucha marmorata

Description

This is a pest that originated in North America. The body color of the lace bug is black, its wings are ivory white, membranous, and have light brown patterns on them. Soft hairs cover its body. Its legs and feelers are light brown. They have 4 joints and the edge of its feeler is round and covered with soft hairs.

The mouth of the lace bug is long and the edge of it is like a needle that can help them suck the juice out of leaves. The front chest of the lace bug is a cone shape and the sides of the body is shape in half circle which covers its head. Its mesoscutum is an inverted triangle. It's back is flat and long, covering its abdomen.

The body length of the late-instar nymph is 2.3 mm. Its body color is yellow but it slowly becomes darker as it gets older. Its body is covered with hair and compound eyes are red. The sides of its chest is big and round. Its abdomen is wide and convex. At the edge, there is are long prickly hairs.

Female and male chrysanthemum lace bugs look similar but the edge of a female's abdomen is round while male's is prominent. Its genitals are located on the edge of its abdomen. Corythucha ciliata looks very similar to this insect but you can distinguish it apart by a semicircular brown pattern.

Life cycle

Its adult and young nymph suck juice near the root. It also sucks juice behind leaves by the following veins of the leaf. The area where it sucked turns off-white. Moreover, it leaves sticky black excreta on the leaf that closes leaf stoma, causing sooty mold and destroys leaf tissue. Its adult spawns 15 to 30 eggs on the back of a leaf. Its egg is less than 1 mm, light brown and long egg-shaped. Its adult and nymph stay behind the leaf in a group. The adults appear from early June to late October and nymphs appear at the start of July. The period of July to August is the peak of population. (Geographical Distribution and Host plants, Dong Eon Kim, Jihyon Kim)

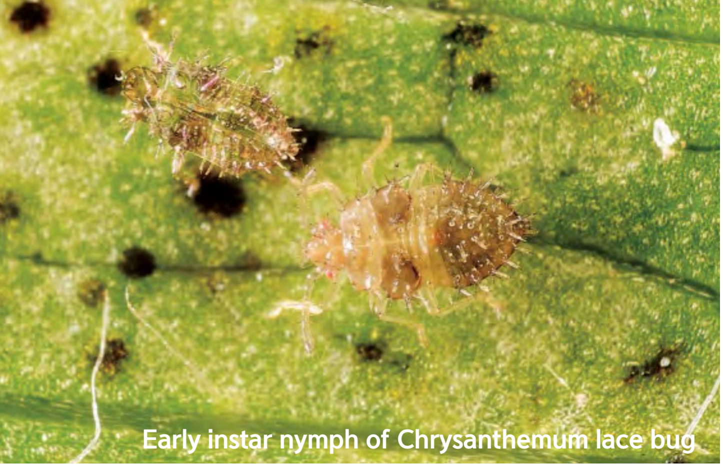
Refer to pages 25, 35~37

JADAM Natural Control Ratio

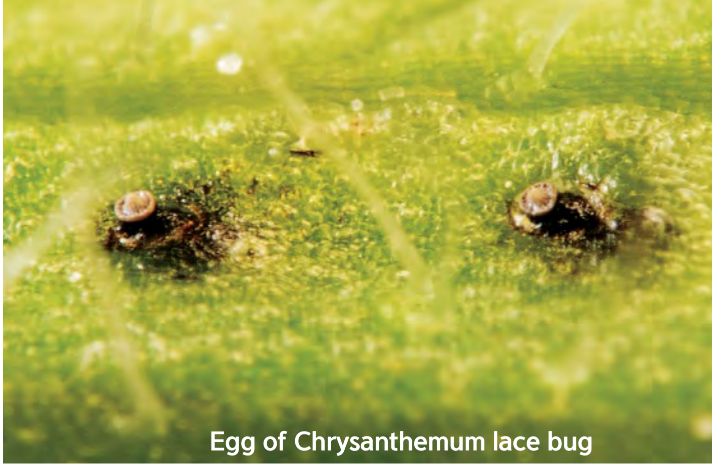
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	400ml
JHS		300ml	400ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	**Visible effect**	10 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

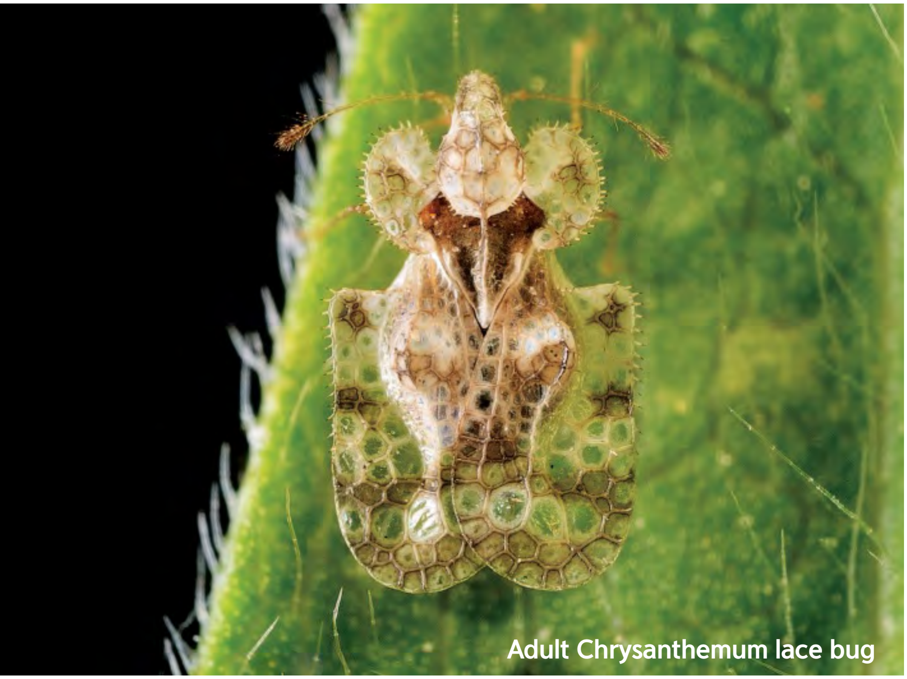
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Early instar nymph of Chrysanthemum lace bug

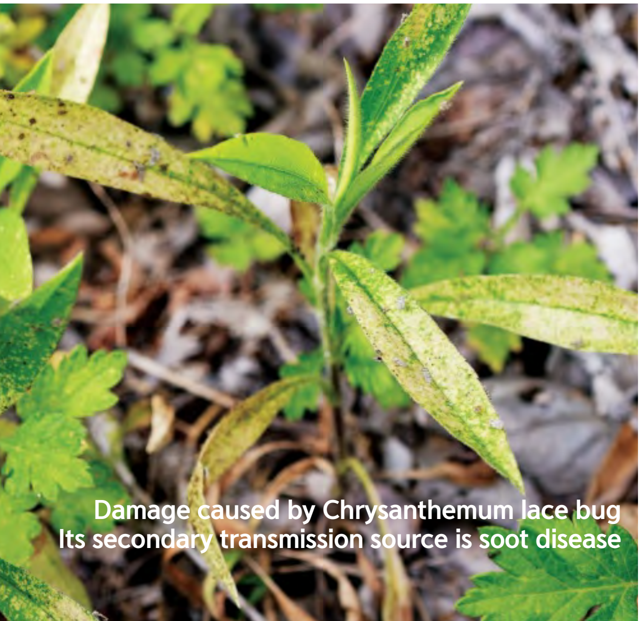


Egg of Chrysanthemum lace bug

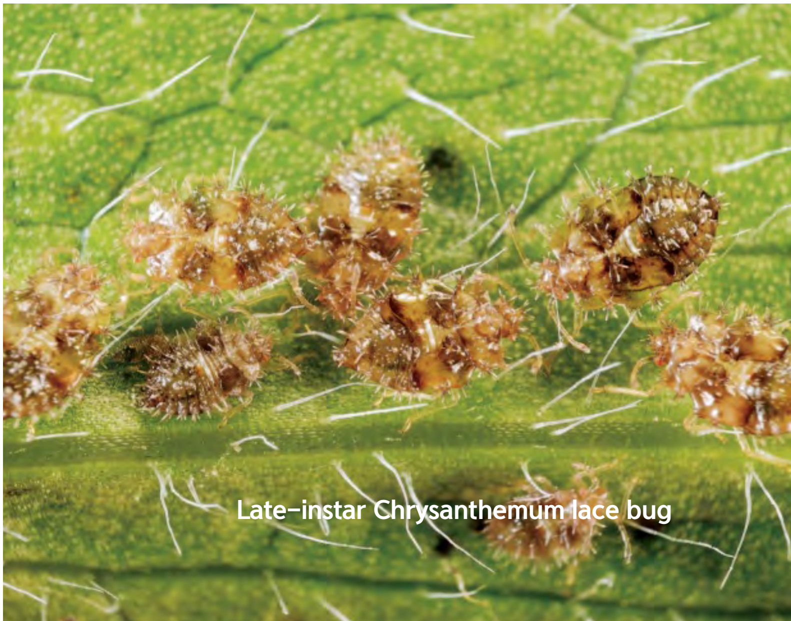


Adult Chrysanthemum lace bug

Mating
of Chrysanthemum lace bug



Damage caused by Chrysanthemum lace bug
Its secondary transmission source is soot disease



Late-instar Chrysanthemum lace bug

Basilepta fulvipes

Description

The body is 1.1mm long, and the head is 0.23mm wide, creamy yellow and C-shaped. The head is yellow, the prominent chin is brown, and the chest and legs are light yellow. The head is an estuary, round and weakly hardened. The forehead has 3 pairs of setae and 2 pairs of antenna (tactile sensors), the ridges and ocellus (simple eye) are absent. The sinciput has 2 pairs of setae, and the upper lip has 3 pairs of setae. The large jaw is hardened, has 3 teeth, and the 3rd tooth is thick and short-pronotum with 9 pairs of setae. The legs are long and slender, and the thighs have 7 setae. In general, the abdominal segment has two folds.

Life cycle

Its primary host plants include Mugwort, Elecampane,, burdock, chrysanthemum, marigold, balm oil, zelkova, water pepper, strawberry, Korean black Rasberry, blackberry, pear tree, cherry tree, apple tree, red oak, licorice, grape.

(National Institue of Biological Resouces/ NIBR)

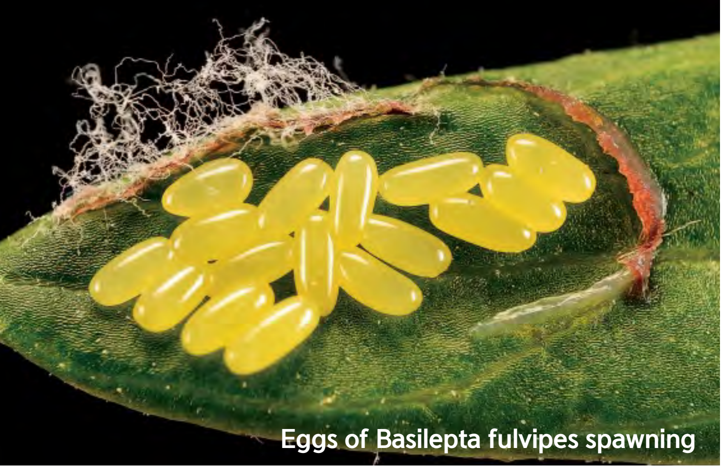
Refer to pages 25, 35~37

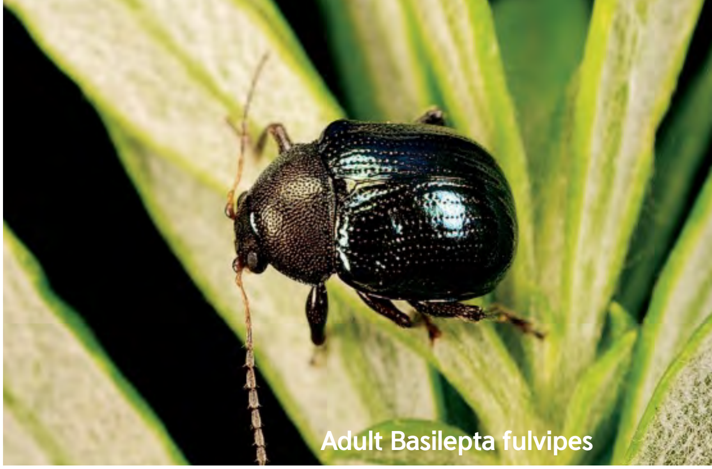
JADAM Natural Control Ratio

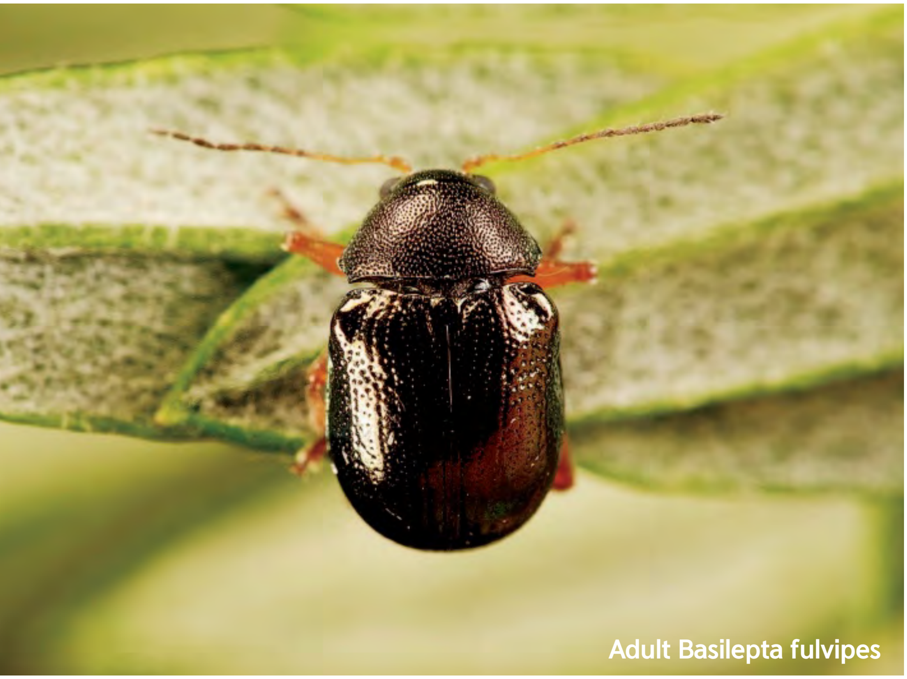
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		60g	80g
Control interval	10days	Visible effect	1~2days

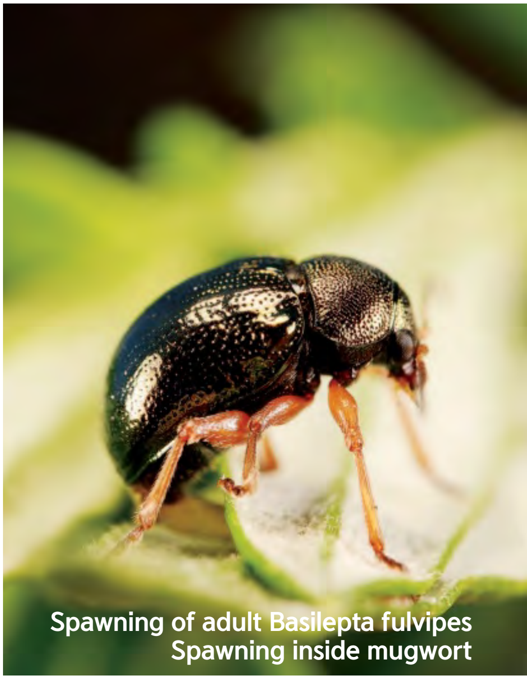
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

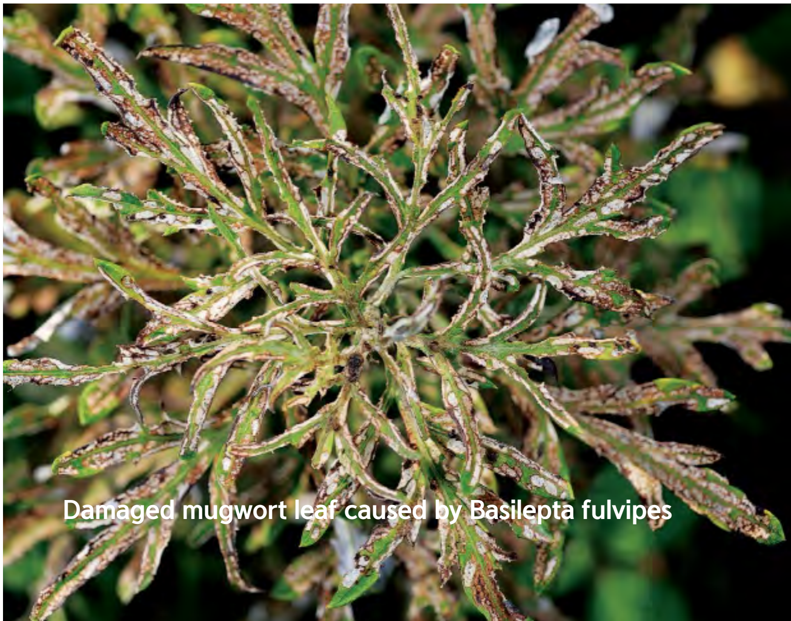
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Eggs of Basilepta fulvipes spawning


Adult Basilepta fulvipes


Adult Basilepta fulvipes


Spawning of adult Basilepta fulvipes
Spawning inside mugwort


Damaged mugwort leaf caused by Basilepta fulvipes

Citrus flatid planthopper

Metcalfa pruinosa

Description

Adults are 5.5 to 8 mm long and 2 to 3 mm wide. It is white at the beginning of the adult insect phase and then varies from brown to gray. The adult insect has large, yellow eyes. When viewed from the side, there are many white dots on all parts of the fore wing and three black dots on the front part in a triangular shape.

The nymph's length grows up to 3.2㎜ (the fifth instar), and the color of the body is white to light green. The nymph's tip is made of a bundle (peacock tail) formed of white wax.

Life cycle

Citrus flatid planthopper occurs one generation per year and overwinters as an egg in the cracks of host branches. Wintered eggs hatch in the middle of late May and become adults after 60 to 70 days after passing through the first to fifth instar period. It emerges as an adult from mid-July, begins spawning from August, and is found outdoors until October. One female lays 90 eggs and easily transfers to neighboring host plants by jumping and flying.

Damage

Citrus flatid planthopper's major habitat is broad-leaved trees such as maple, Japanese Elm, and Salix koreensis, including fruit trees such as grape, citrus trees, apricots, and peach trees. It secretes white substances and sticks to leaves, branches, and fruits. For this reason, when the number of pests increases rapidly, host trees may suffer from poor growth or soot disease on leaves or stems.

(National Crop Pest Management System/NCPMS)

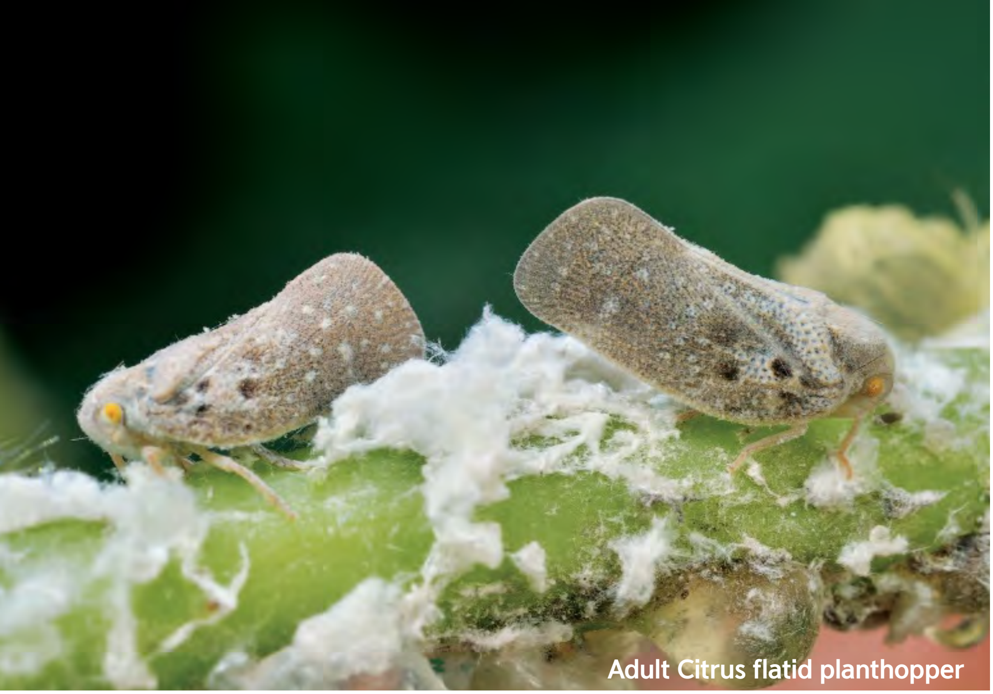
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Winter Control	Infestation	Emergency
JS	200ml		
JWA	400ml	500ml	600ml
JHS	600ml	500ml	600ml
JMS			
NaOH	60g	40g	60g
Fine soil	80g	40g	60g
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- JHS, made from ginkgo berries, is the most effective.
- This pest flies away when spraying pesticides and then comes back. For complete control, it is recommended to control 2-3 times at intervals of 1 to 2 days.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

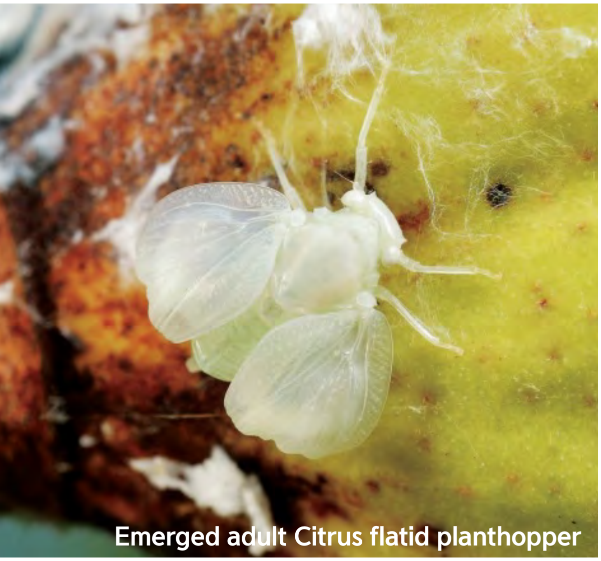
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



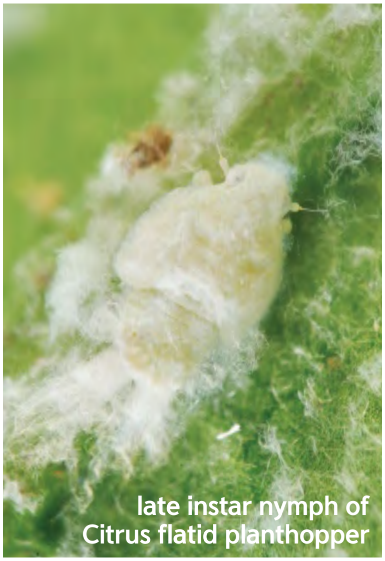
Adult Citrus flatid planthopper

Damage caused
by Citrus flatid planthopper

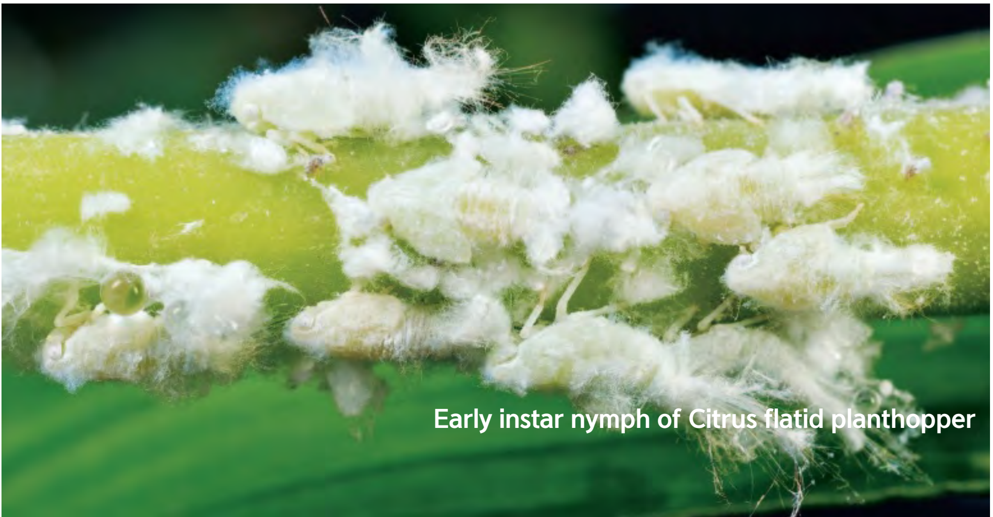
Damage caused
by Citrus flatid planthopper



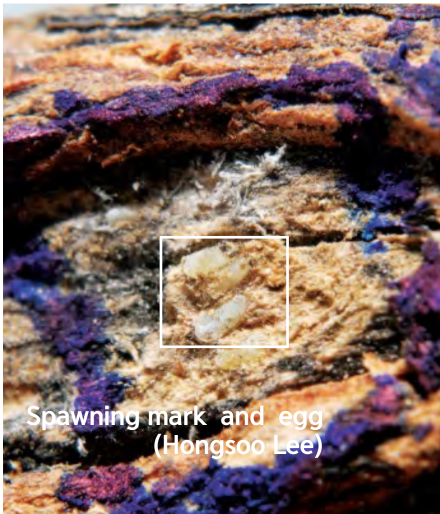
Emerged adult Citrus flatid planthopper



late instar nymph of
Citrus flatid planthopper



Early instar nymph of Citrus flatid planthopper



Spawning mark and egg
(Hongsoo Lee)

Pear lace bug

Stephanitis nashi

Description

The body length of pear lace bugs are average of 3~3.5 mm. The adult's forewing have retiform nervure that are translucent. When the insect folds its wings, you can see the black spotted pattern on the wings and it looks like a shield. The bug's head is small and brown and they have protruded compound eyes. The lower part of its body is black and its legs are yellow.

Life cycle

It appears 3~4 times a year and stays over the winter as an adult on the weeds, fallen leaves, and the lower part of the stem. From early to middle of May, the pear lace bug spawns on the midrib or inside tissue following the 1st vein and it covers its eggs with its brown secretion.

Damage

It rarely occurs in conventionaly farmed orchard control orchards, and it does not progress to severe damage. Therefore, when controlling other pests, control them at the same time. (KOREA FOREST SERVICE)

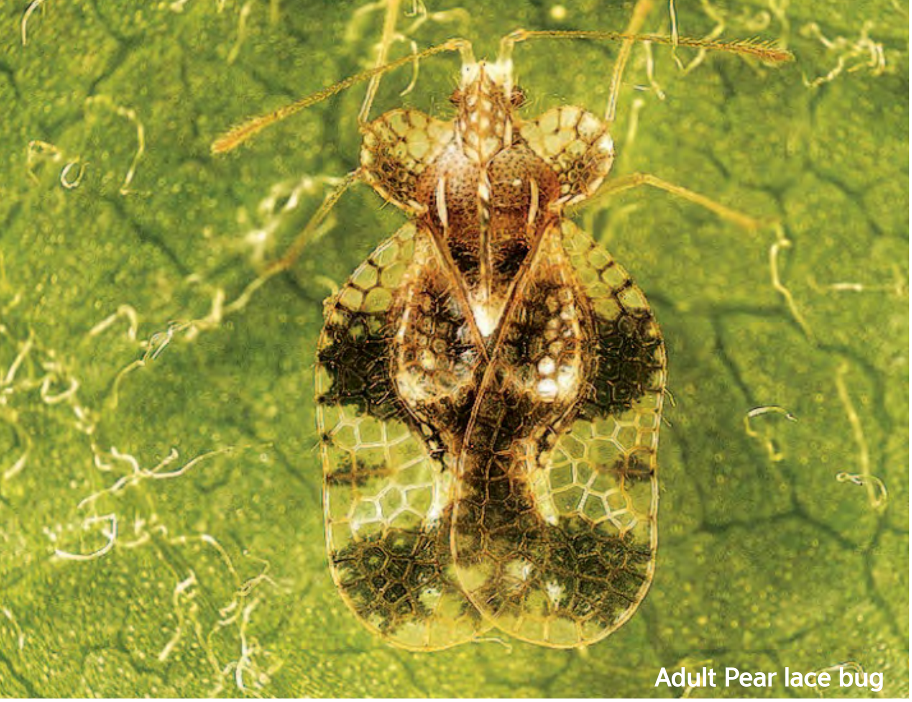
Refer to pages 25, 35~37

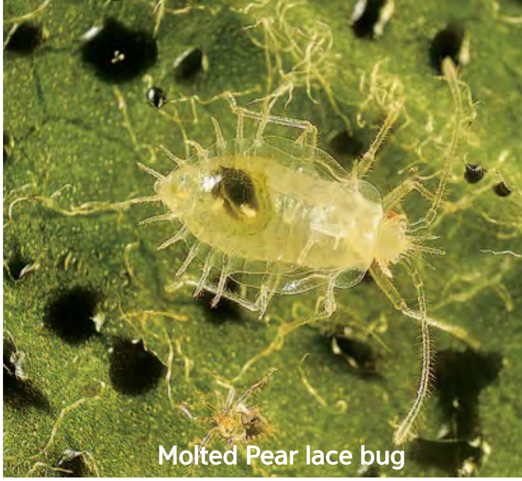
JADAM Natural Control Ratio

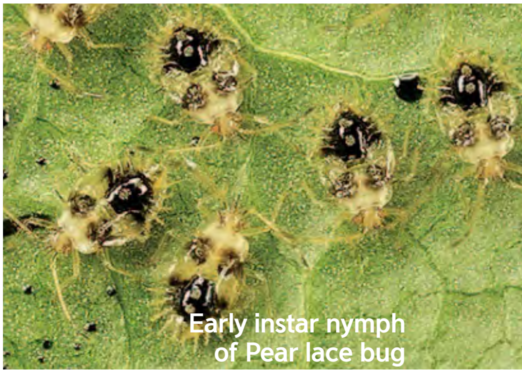
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	400ml
JHS		300ml	400ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	10days	**Visible effect**	10 minutes

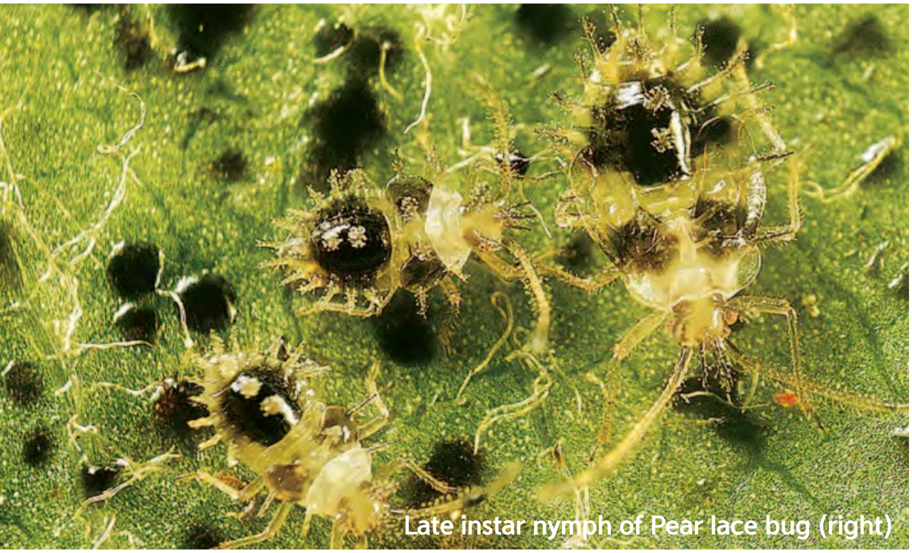
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

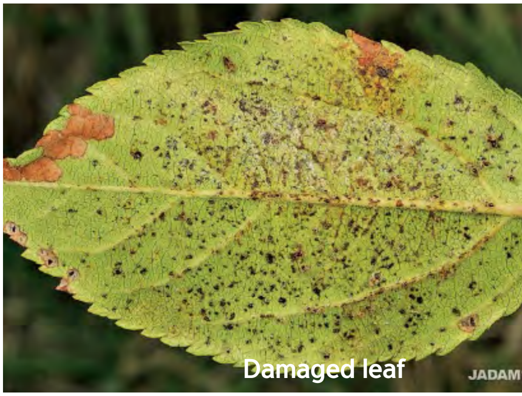
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Pear lace bug

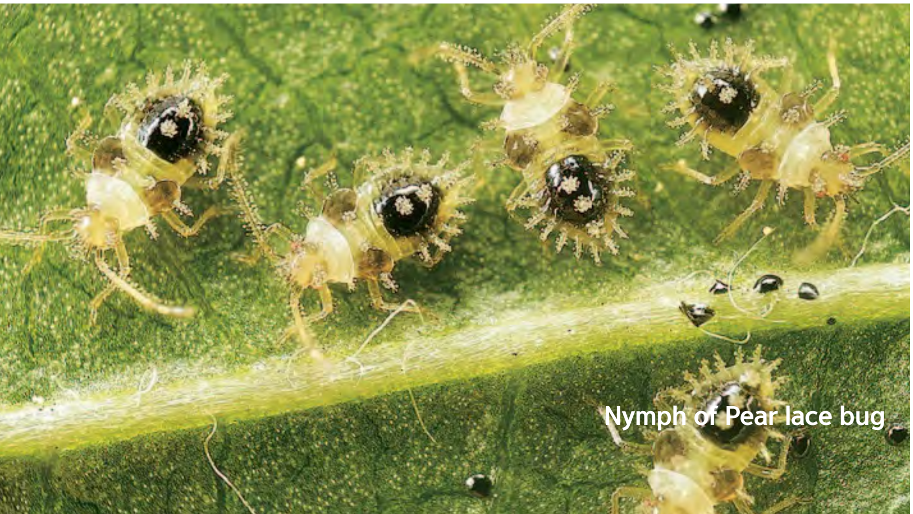

Molted Pear lace bug

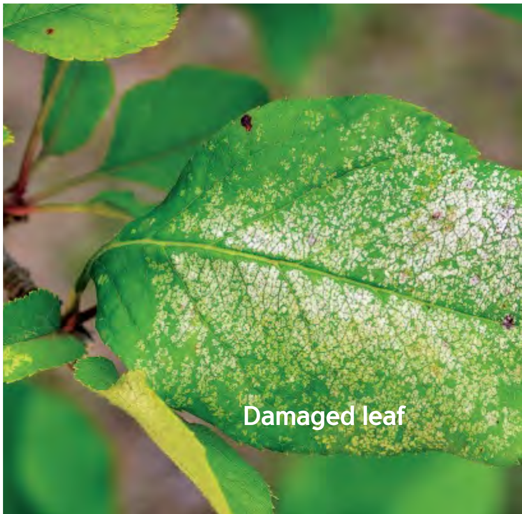

Early instar nymph
of Pear lace bug


Late instar nymph of Pear lace bug (right)


Damaged leaf

JADAM


Nymph of Pear lace bug


Damaged leaf

Striped flea beetle

Phyllotreta striolata

Description

The Striped flea beetle has a shape similar to a flower, its size is 2~3㎜, its body color is black, and there are crank-shaft shaped orange vertical bands on both sides of the hard outer wing (elytra). The egg is oval and slightly transparent, and its size is about 0.5mm. The larvae are thin, long, milky, the head is brown, and the full-grown larva is about 8mm. It becomes a pupa in the ground, and the size is 2~3㎜.

Life cycle

It winters as an adult and occurs 3 to 5 times a year. In April, adult insects spawn one at a time in the roots of a crop or below the soil, and each one lays 150-200 eggs for 30 days. Adults increase in May-June, and decrease slightly in summer. Look around the young leaves with holes, small bugs with yellow vertical patterns on a black background are observable.

Damage

Adult insects feed on the leaves of cruciferous crops and sugar beets. There is a lot of damage to the seedlings and it continue to live in a gnawed hole while making it bigger by eating. The larvae eat randomly on the root surface of radish or turnip in the ground, and it is also the cause of black rot disease. The damage is severe from late spring to summer.
(National Crop Pest Management System/NCPMS)

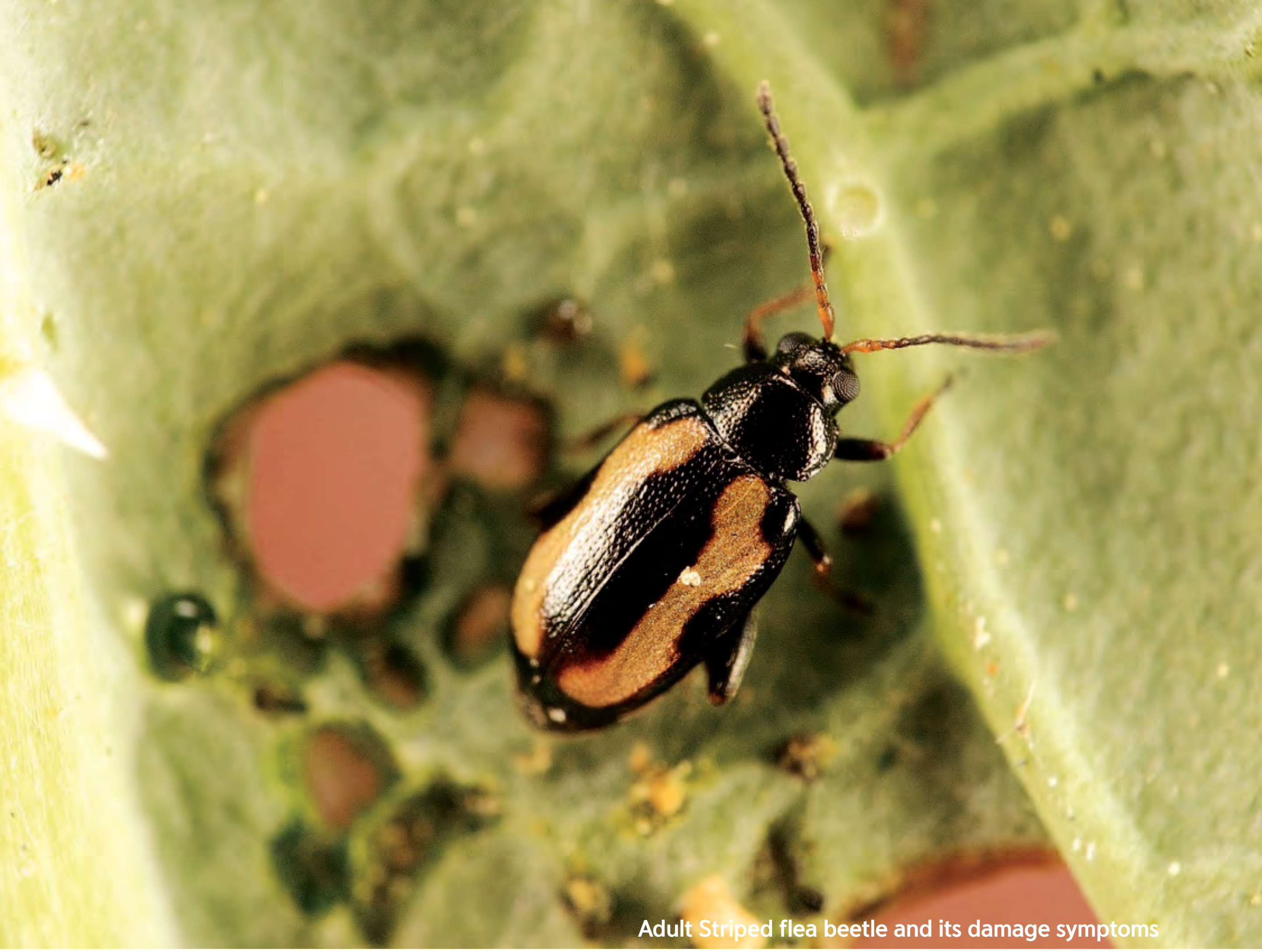
Refer to pages 25, 35~37

JADAM Natural Control Ratio

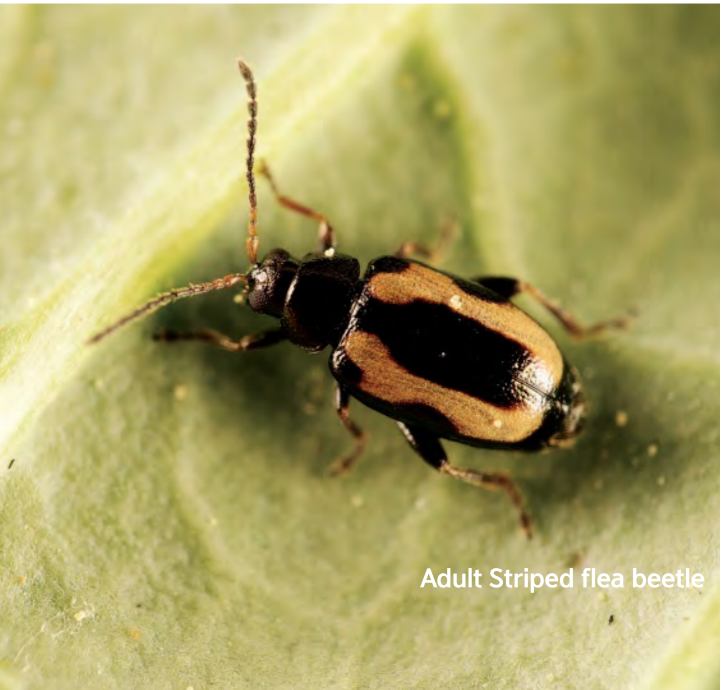
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

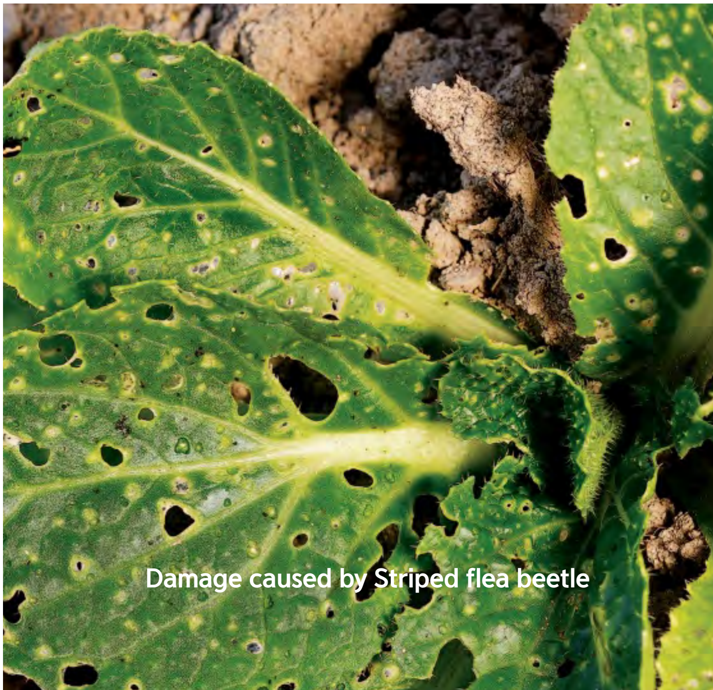
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Striped flea beetle and its damage symptoms



Adult Striped flea beetle



Damage caused by Striped flea beetle

Chrysolina aurichalcea

Description

The body length is about 7-10mm. The color of the body is glossy black copper or blue-green. There are few spots on the forehead with irregularly recessed areas. The antenna (tactile sensors) is black, and 2 segments are partially reddish brown. The hard outer wing (elytra) have dense spots on their surface and have a distinct vertical line.

Life cycle

Larvae can be seen in the winter after April and damage the new leaves of mugwort until May. Then it goes into estivationin summer. In September, the population increases again and eats leaves and flowers. It breeds from the beginning of October to November. Adult insects appear to damage the new leaves of the Asteraceae plant from spring to autumn.

They are most active from May to June. When stimulated, they easily fall to the ground [deleted] pretending to be dead. (KOREA FOREST SERVICE)

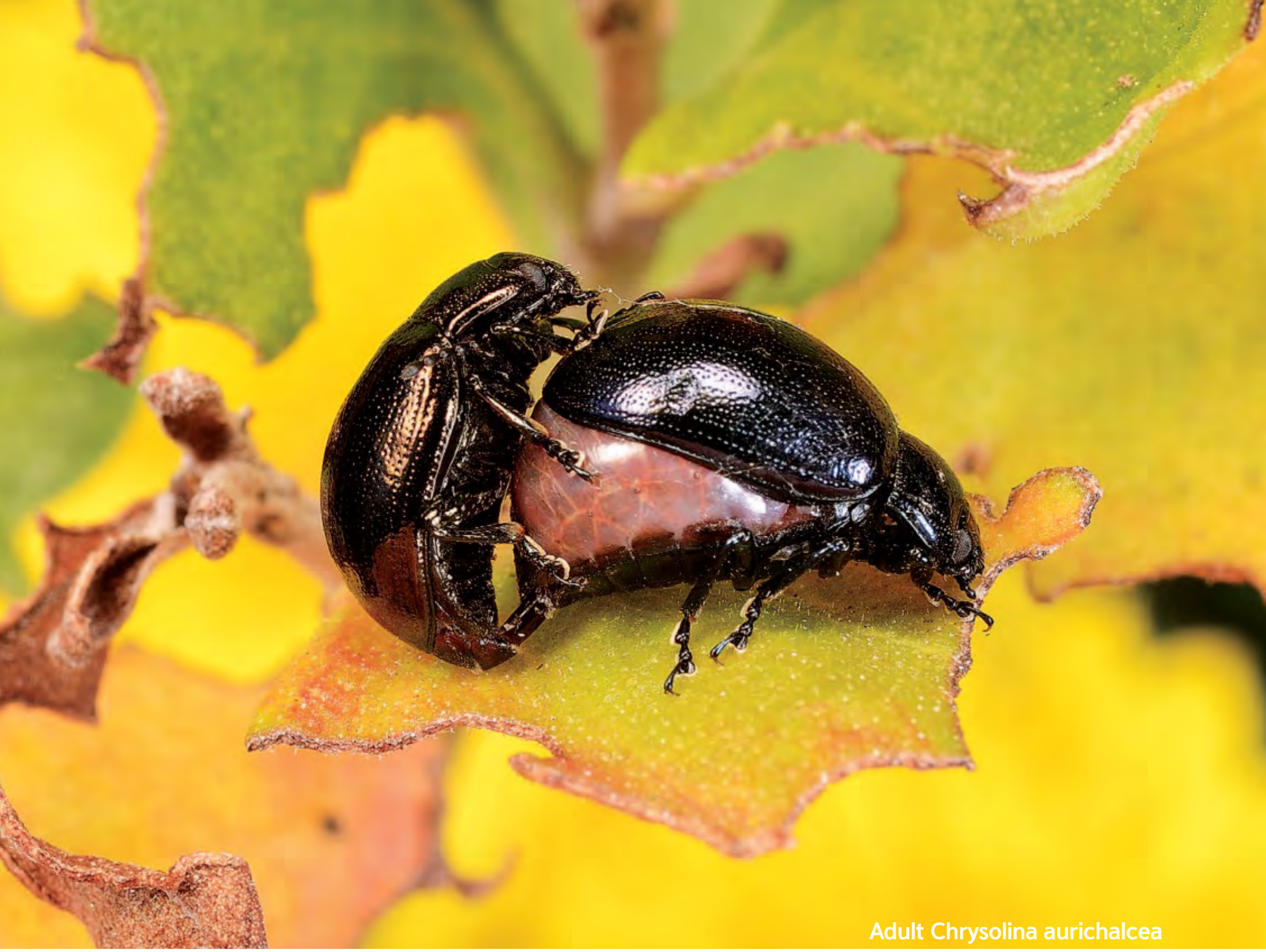
JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		600ml	800ml
JHS		600ml	800ml
JMS			
NaOH		60g	80g
Fine soil		100g	150g
Control interval	7days	**Visible effect**	1~2days

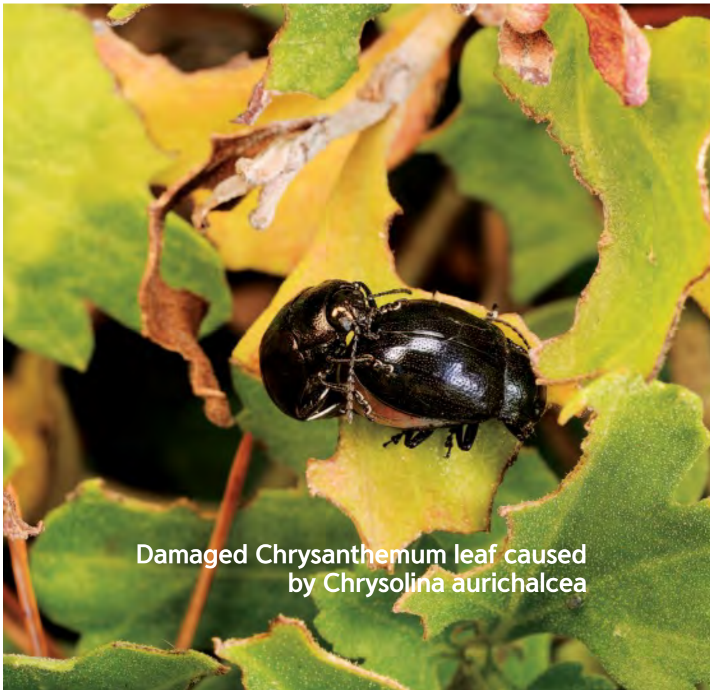
- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Chrysolina aurichalcea

Adult Chrysolina aurichalcea



Damaged Chrysanthemum leaf caused by Chrysolina aurichalcea

Lema decempunctata

Description

The body length is around 5mm. The head and thorax are black. The hard outer wing (elytra) has black spots on a yellowish-brown background having left and right symmetry.

Life cycle

Transformation is carried out through eggs, larvae, pupae, and adult worms. Adult insects occur from early April to November and lay yellow long, thin, cylindrical eggs in two rows on Goji berry leaves. The larva protects itself from natural enemies by camouflaging with mucous secretions. It is known to winter as an adult bug and occurs about 3-4 generations per year.

Damage

Young larvae mainly damage young leaves, but as they grow, their appetite becomes vigorous and will devour so much that only stems remain.
(Doosan Encyclopedia)

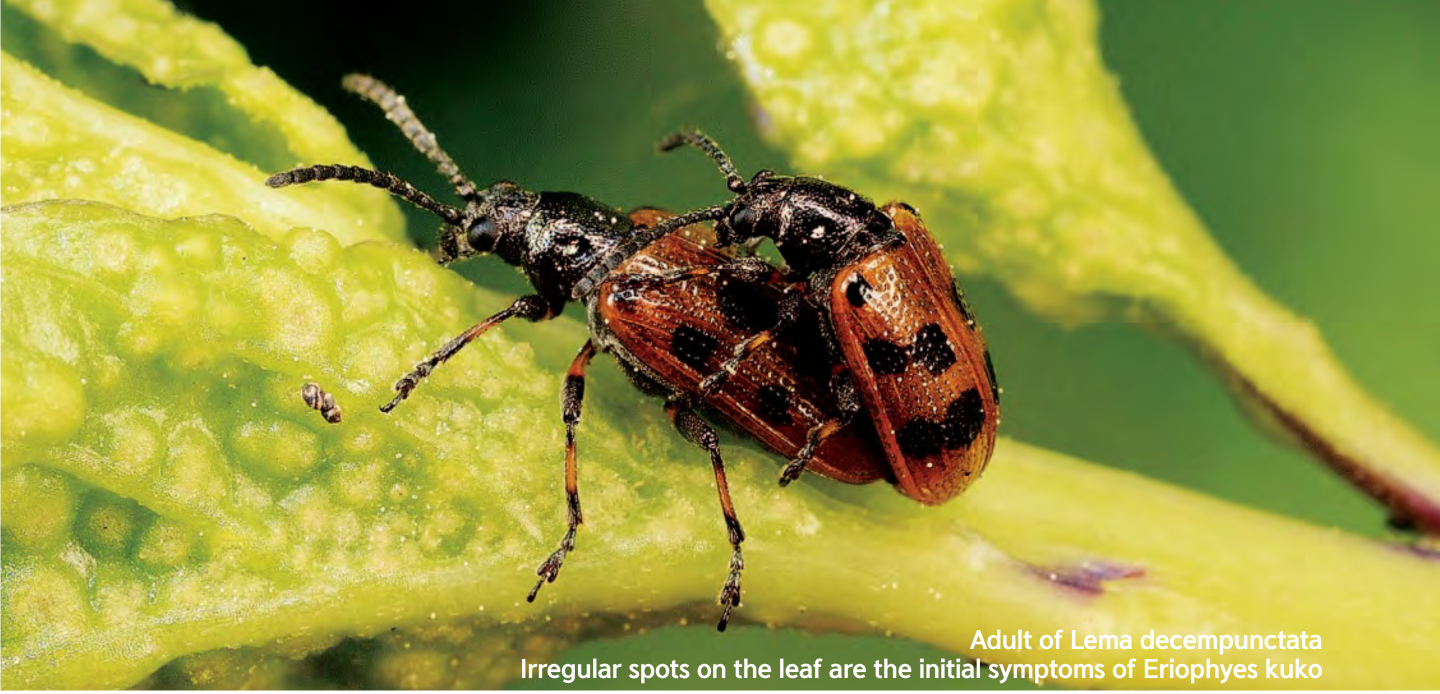
JADAM Natural Control Ratio

Refer to pages 25, 35~37

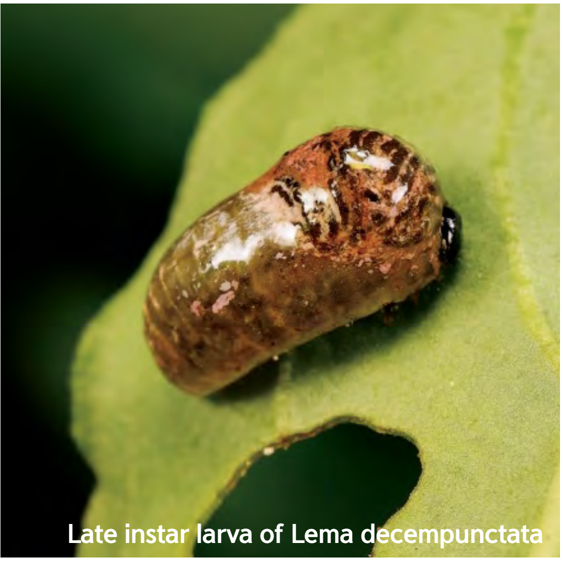
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil		60g	80g
Control interval	10days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

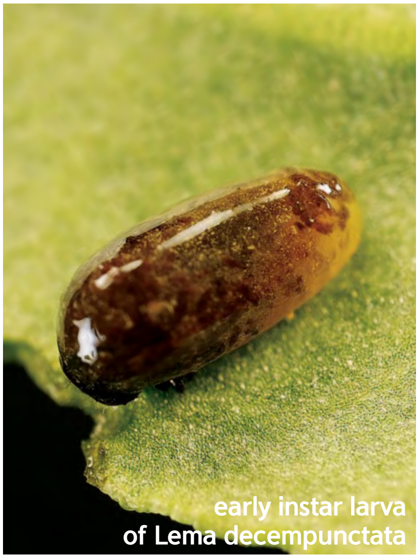
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



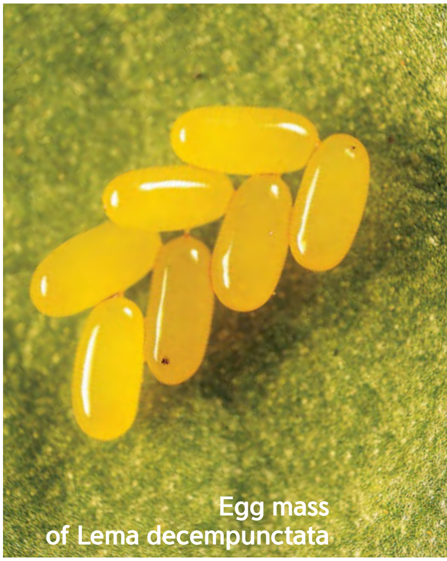
Adult of Lema decempunctata
Irregular spots on the leaf are the initial symptoms of Eriophyes kuko



Late instar larva of Lema decempunctata

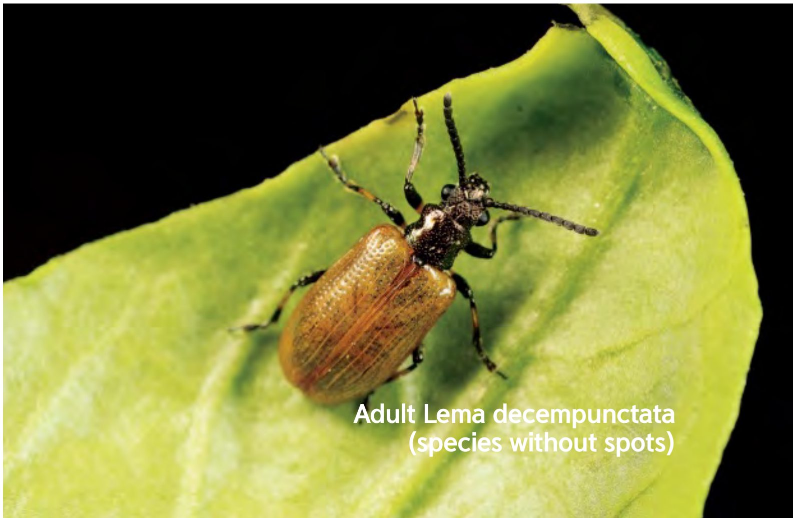


early instar larva
of Lema decempunctata



Egg mass
of Lema decempunctata

Lema decempunctata damage on Goji berry



Adult Lema decempunctata
(species without spots)

Striped cucumber beetle

Acalymma vittatum

Description

The striped cucumber beetle is a small beetle approximately half a centimeter (1/5 inch) in length, and characterized by brown-yellow hard outer wing (elytra) completely covers the abdomen and longitudinally transversed by three thick black stripes. It superficially resembles the western corn rootworm (Diabrotica virgifera), another serious crop pest. However, the ventral abdominal surface of A. vittatum is black where that of D. virgifera are yellow, and the elytra of D. virgifera often do not extend the full length of the abdomen.

Life cycle

Striped cucumber beetles can cause significant amounts of foliar damage to cucurbit crops, particularly to older plants, and larval root feeding also damages the plant. The most damage is often seen in the beging of the year during the emergence of overwintering beetles, but feeding damage continues throughout the entire growing season. Furthermore, adult beetles are one of two known vectors of the bacterial wilt Erwinia tracheiphila, an incurable and often fatal disease of cucurbits. Bacteria passes from the frass of the beetle into feeding wounds that reach into the vascular tissues of the plants, where they proliferate to the point of blocking the xylem. (wikipedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		500ml	600ml
JHS		500ml	600ml
JMS			
NaOH		40g	60g
Fine soil		60g	80g
Control interval	5days	Visible effect	1~2days

- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- If there is a large amount of this pest, it is recommended to spray three times consecutively at 1-hour intervals.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(D. Gordon E. Robertson.wikimedia)

(Scott Bauer.wikimedia)

(RFMitchell wikimedia)

Curcubit beetle

Aulacophora indica

Description

Body length is 5.6~7.3mm, antennae (tactile sensors) are reddish-brown, and depending on the individual, the color is slightly dark. The back and head are reddish-brown, the middle thorax and the back thorax are black.

Life cycle

An adult can be found in cucumbers and various other plants, they are notorious pests. The larva is known as the corn rootworm. Adult insects appear in April-May, spawn in May-June, and overwinter in dry ground in November. They occur once a year and winter as an adult. Each stage's total period is 2 weeks for eggs, 3-4 weeks for larvae, and 2 weeks for the pupa.

Damage

Larvae gnaw on the roots and fruits that have touched the ground which leads to a healthy crop suddenly wilting and gradually dying.
(Korea National Arboretum)

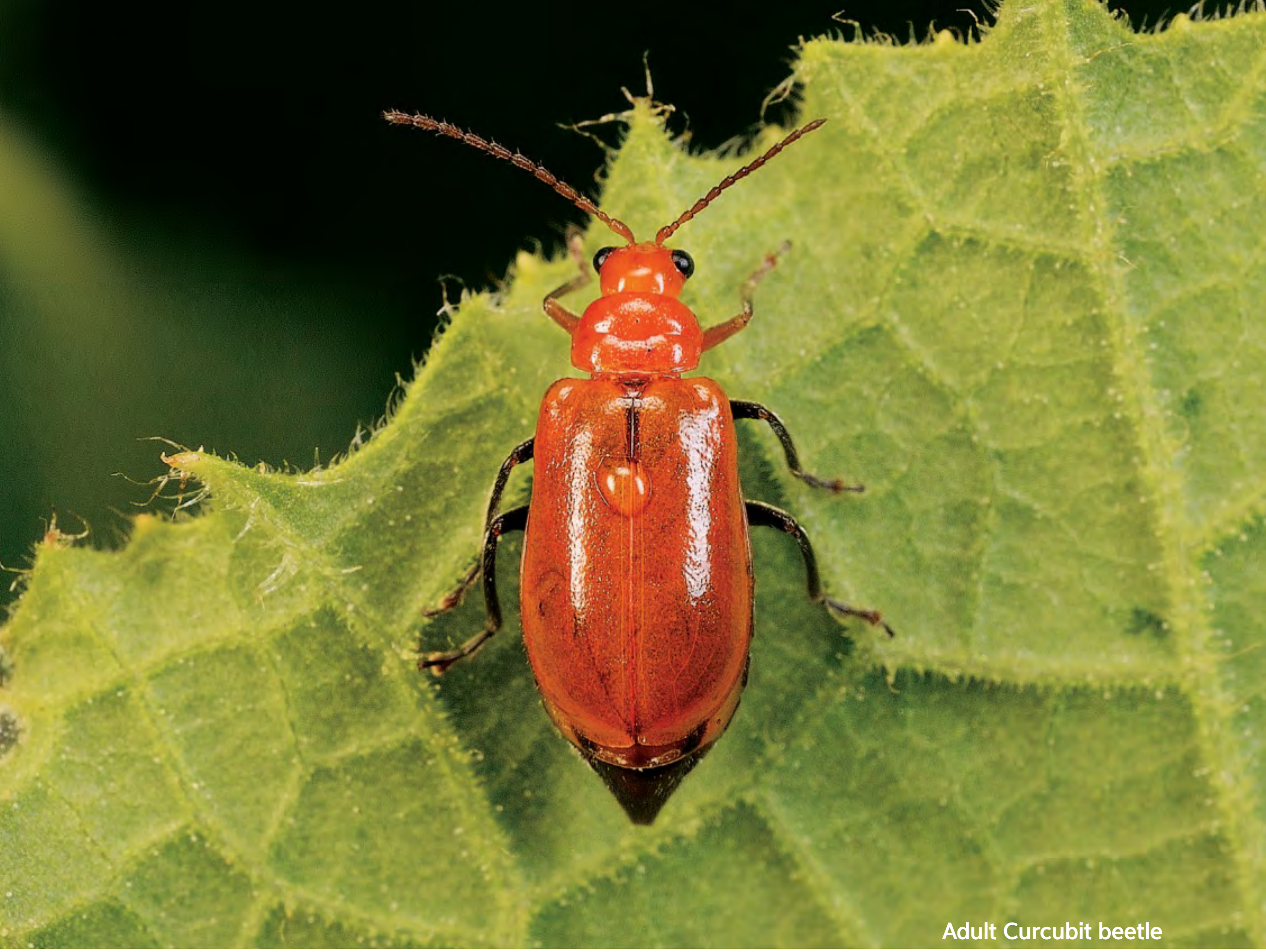
Refer to pages 25, 35~37

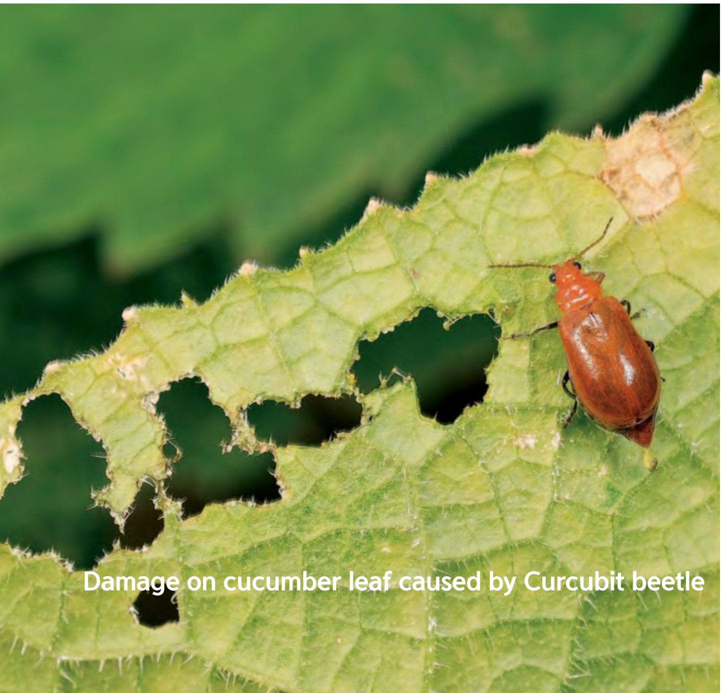
JADAM Natural Control Ratio

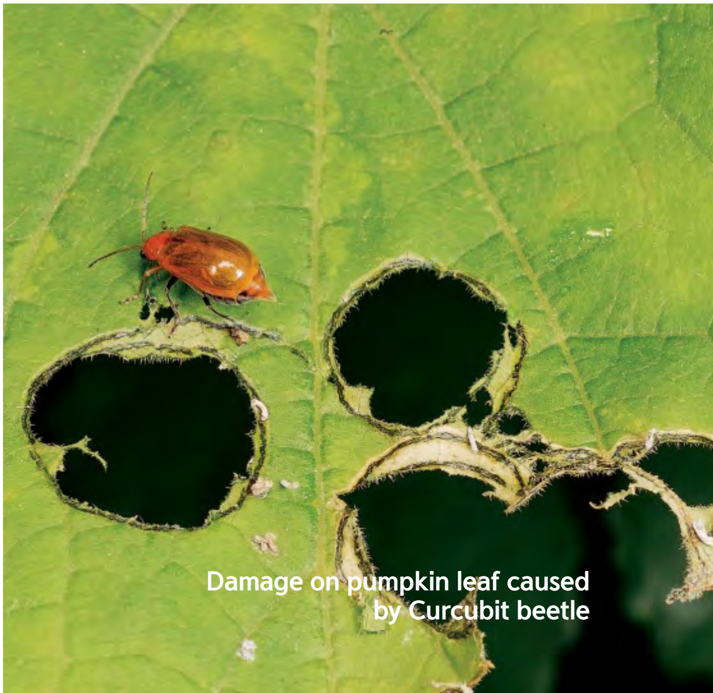
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Curcubit beetle


Damage on cucumber leaf caused by Curcubit beetle


Damage on pumpkin leaf caused by Curcubit beetle

Japanese beetle

Popillia japonica

Description

The Japanese beetle (Popillia japonica) is a species of scarab beetle. The adult measures 15 mm (0.6 in) in length and 10 mm (0.4 in) in width, has iridescent copper-colored hard outer wing (elytra) and a green thorax and head. It is not very destructive in Japan, where it is controlled by natural predators, but in North America, it is a noted pest of about 300 species of plants including rose bushes, grapes, hops, canna, crape myrtles, birch trees, linden trees, and others.

Life cycle

Within approximately two weeks, the ova hatch, the larvae feed on fine roots and other organic material. As the larvae mature, they become c-shaped grubs which consume progressively coarser roots and may do economic damage to pasture and turf at this time. Larvae hibernate in small cells in the soil, emerging in the spring when soil temperatures rise again. Most of the beetle's life is spent as a larva, with only 30–45 days spent as an adult beetle.

The activities of these beetles will alternate daily between mating, feeding, and ovipositing. An adult female may lay as many as 40–60 ova in her lifetime. Throughout the majority of the Japanese beetle's range, its lifecycle takes one full year, however in the extreme northern parts of its range, as well as high altitude zones as found in its native Japan, development may take two years.

Damage

Adults feed on leaf material above ground, using pheromones to attract other beetles and overwhelm plants, skeletonizing leaves from the top of the plant downward. (wikipedia)

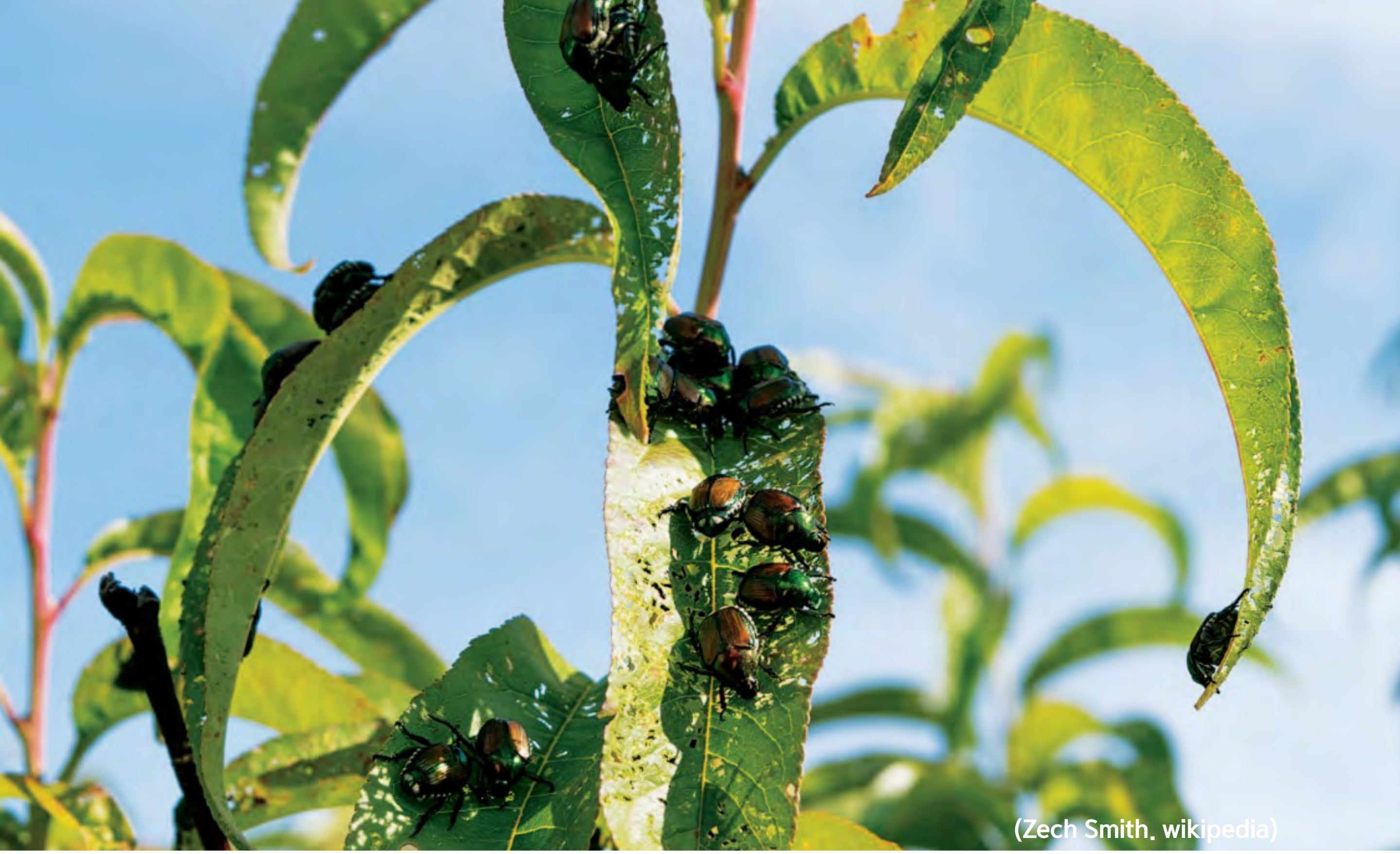
Refer to pages 25, 35~37

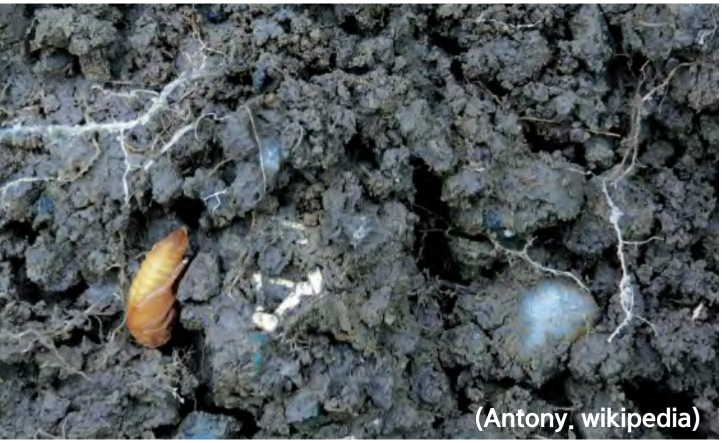
JADAM Natural Control Ratio

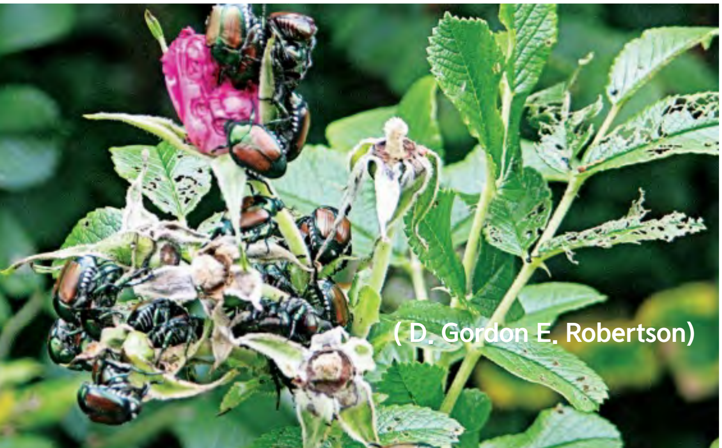
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		600ml	800ml
JHS		600ml	800ml
JMS			
NaOH		60g	80g
Fine soil		100g	150g
Control interval	5days	**Visible effect**	1~2days

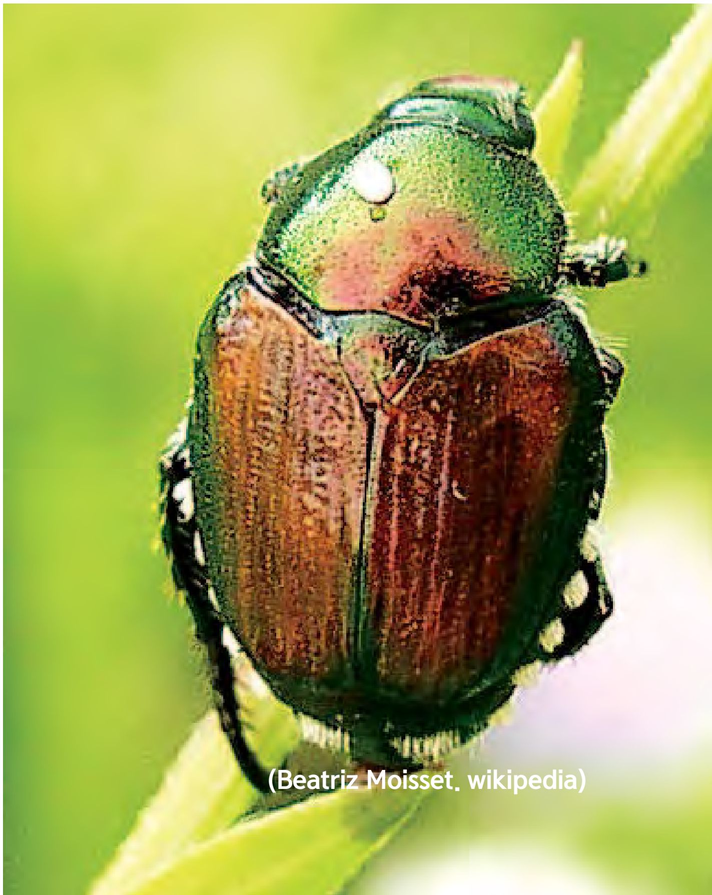
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- If there is a large amount of this pest, it is recommended to spray three times consecutively at 1-hour intervals.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


(Zech Smith, wikipedia)


(Antony, wikipedia)


(D. Gordon E. Robertson)


(Beatriz Moisset, wikipedia)

Daikon Leaf Beetle

Phaedon brassicae

Description

The body length is 3.3~4.0mm, and the body color is glossy indigo black. The body is oval, and when viewed from the side, they have a half-moon shape. There is a robust protruding part on the pronotum, and there is a dense dot pattern. There are 12 dots on the wings. The larvae have a light yellow color immediately after hatching from the egg but later turn black.

Life cycle

It is also known as a pest of cruciferous vegetables such as radish and cabbage. Adult insects are active in May-June, and in June, they lay eggs in the stems and petioles. The larvae eat leaves and molt twice. It occurs 2-3 times a year and frequently occurs from spring to early summer. In general, the damage is severe in the fall. (KOREA FOREST SERVICE)

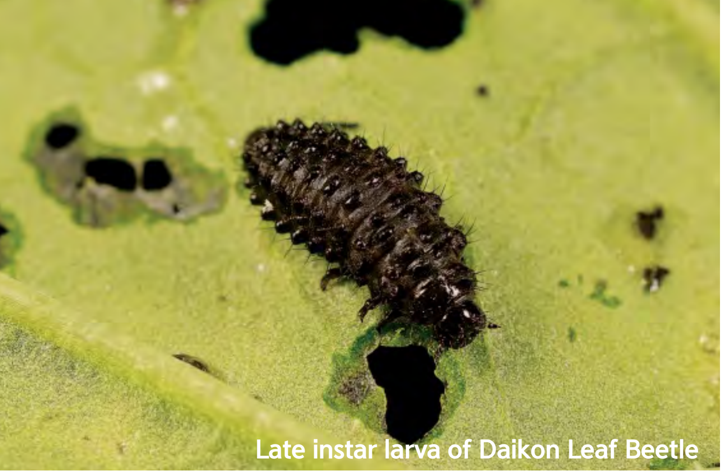
JADAM Natural Control Ratio

Refer to pages 25, 35~37

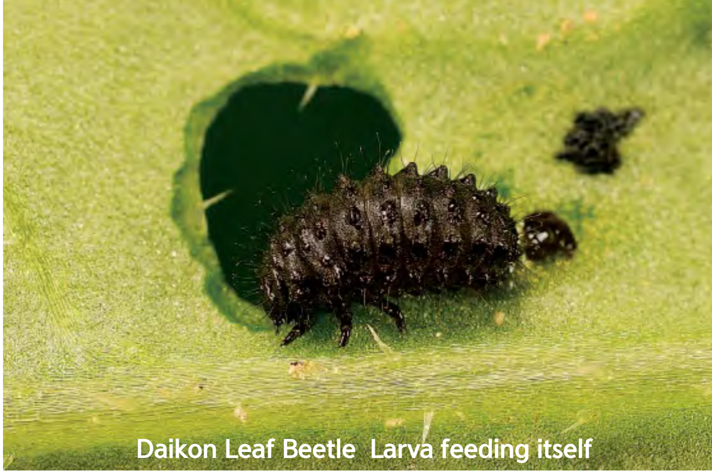
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

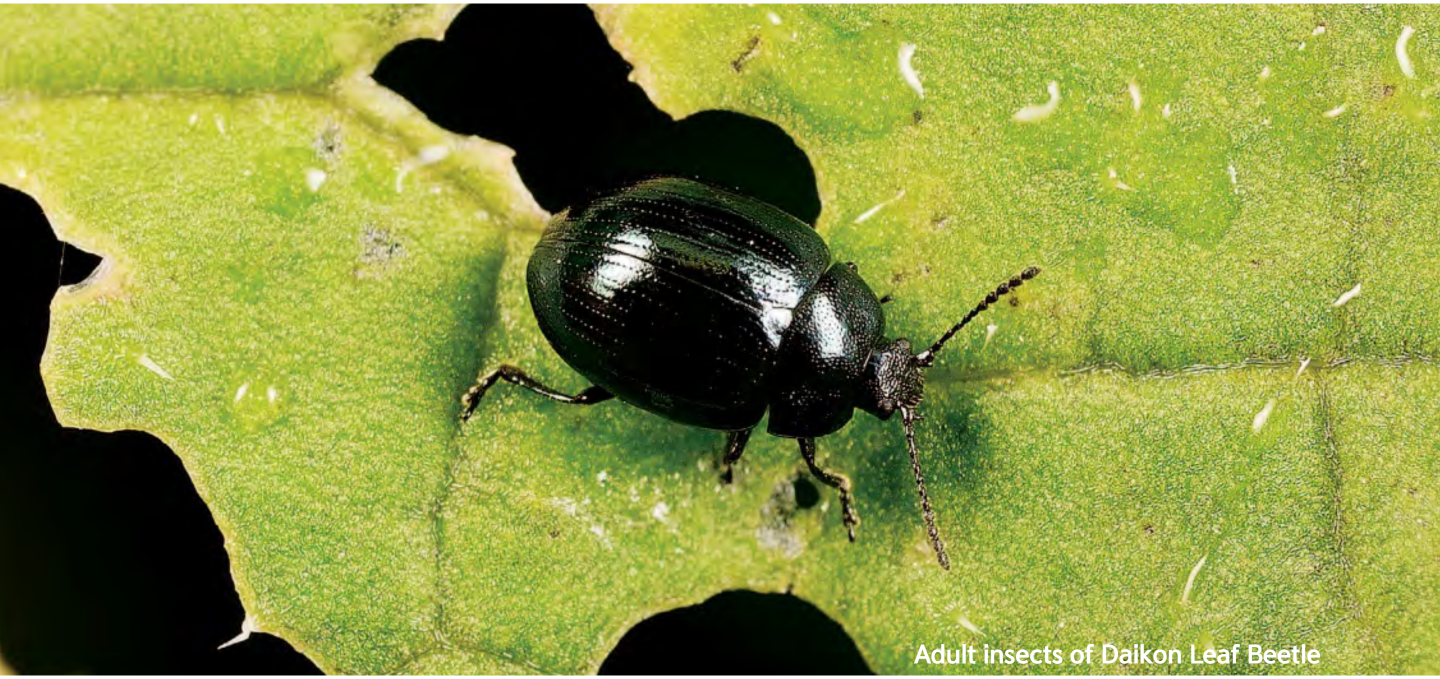
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



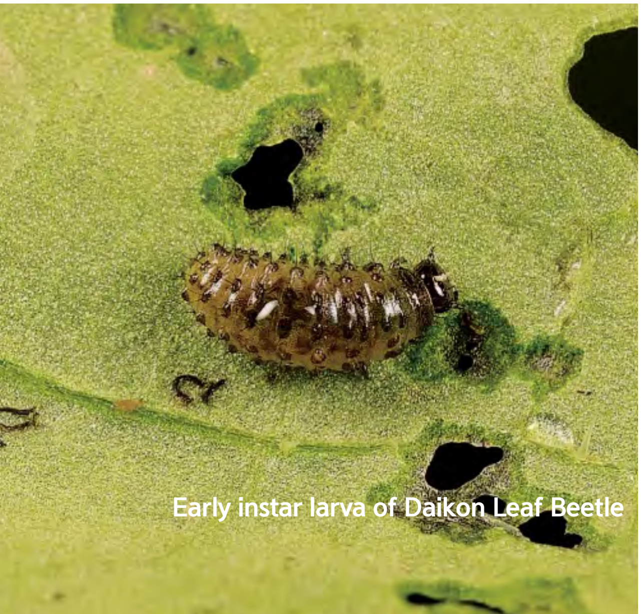
Late instar larva of Daikon Leaf Beetle



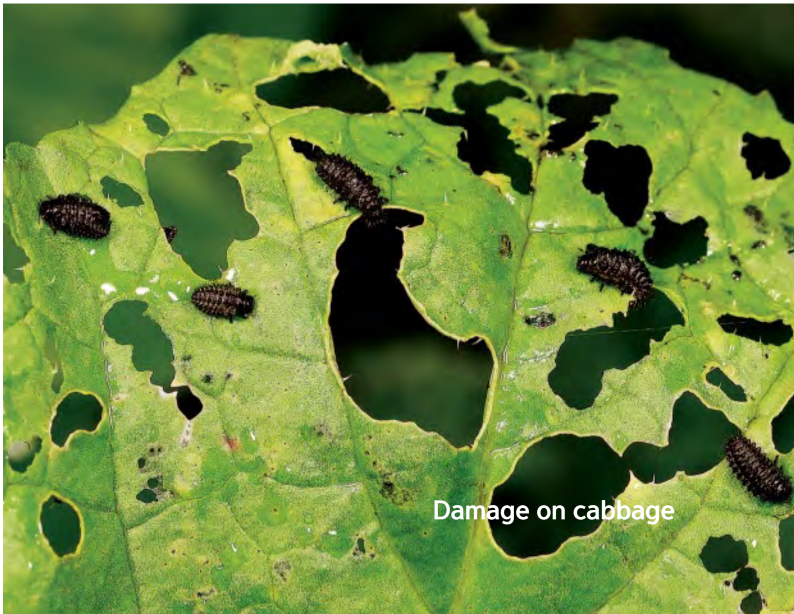
Daikon Leaf Beetle Larva feeding itself



Adult insects of Daikon Leaf Beetle



Early instar larva of Daikon Leaf Beetle



Damage on cabbage

Other pests

Allantus luctifer

Description

The body length of an adult is around 15 to 20mm. Allantus luctifer's body color is grayish-green color and its head and the edge of its stomach are yellow. There is a big black dot following their spiracle.

Life cycle

It is estimated to occur once or twice a year, and larvae mainly appear in July and often appear in October, but the number of occurrences is smaller than in July. Larvae gather in July and eat leaves. If the damage is severe, it eats all the leaves, leaving only branches.

(Tree pest encyclopedia. Moon Seong-cheol)

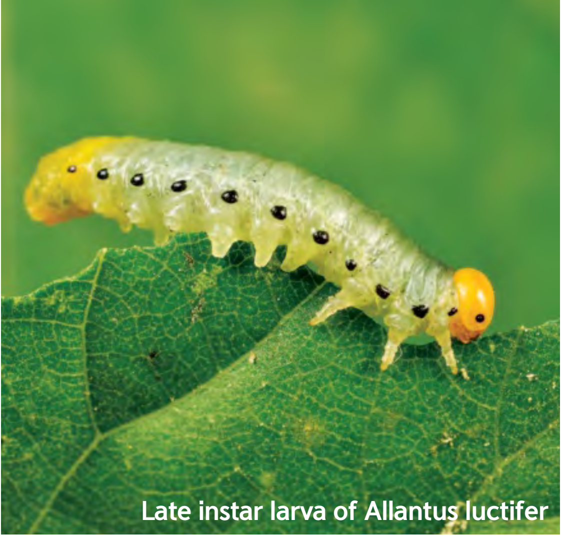
Refer to pages 25, 35~37

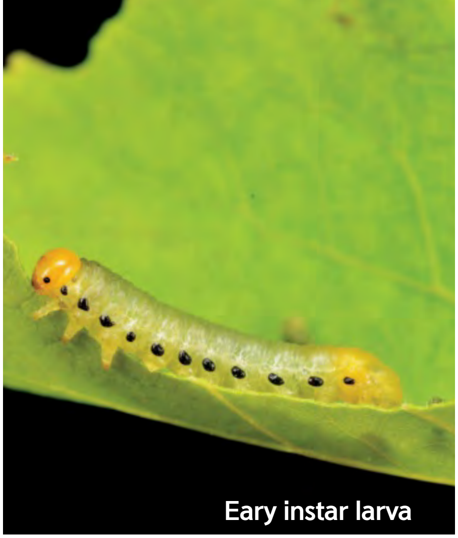
JADAM Natural Control Ratio

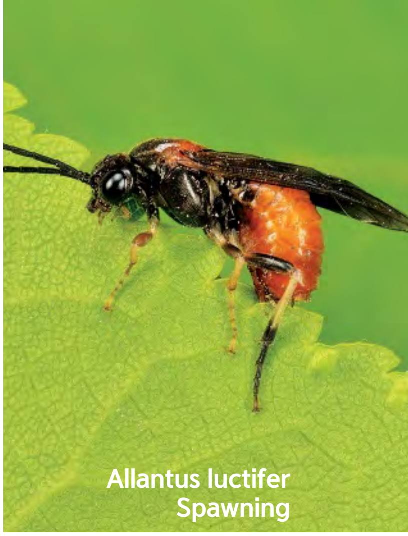
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	10 minutes

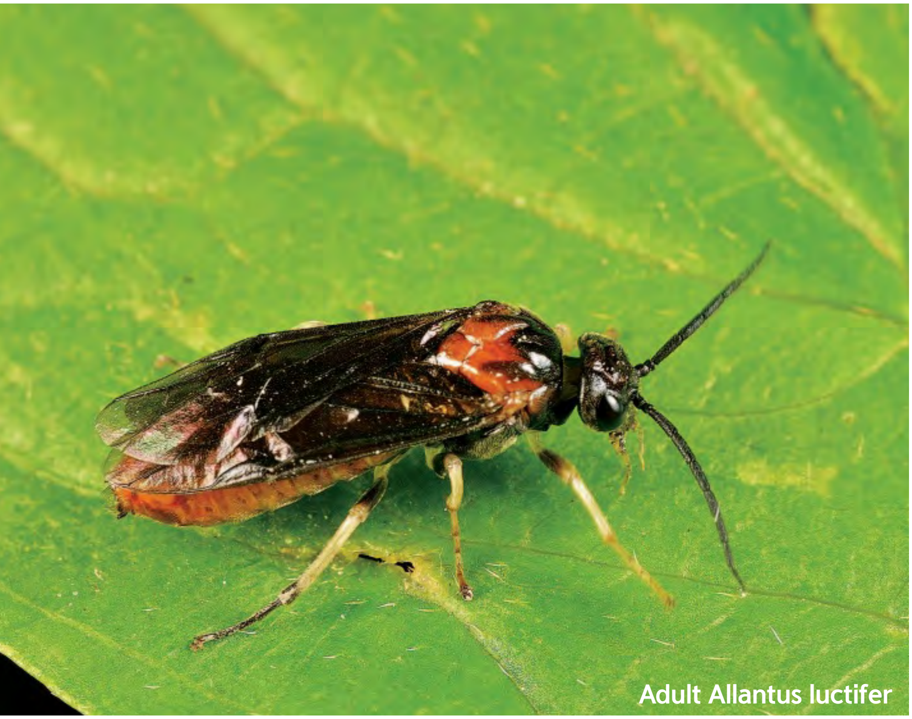
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

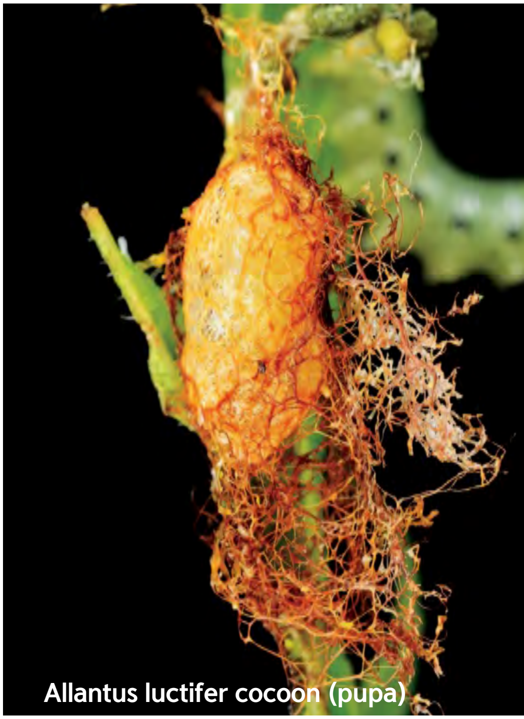
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Late instar larva of Allantus luctifer


Eary instar larva


Allantus luctifer
Spawning


Adult Allantus luctifer


Allantus luctifer cocoon (pupa)

Damage on apricot tree caused
by Allantus luctifer in summer

Damage on apricot tree caused

Pill bugs

Armadillidium vulgare

Description

Its body length is about 14mm, and it is found all around the world, and they have a shape similar to a woodlouse. The body is divided into 7 segments, including 1 head, 1 thorax, and 5 segments of the abdomen. When viewed from above, 5 abdominal segments are clearly visible. There are two pairs of antennae(tactile sensors), but the first one is smaller and hardly visible. The second antennae protrude in front of the head and are bent three times in the middle. The body-color is dark brown or gray. They live in humid places such as bark, fallen leaves, and under-stones.

Life cycle

They hide in dark and humid places during the day and come out at night to wander around. It is called a pocket bug' or a bean bug' because it tends to curl up when it is surprised. It is omnivorous and mainly consumes humus, such as mold, plant, and animal carcasses. (Doosan Encyclopedia)

Damage

The diet of pill bugs is largely made up of decaying or decomposed plant matter such as leaves, and to a lesser extent, wood fibers. Pill bugs will also eat living plants, especially in wet conditions, sometimes consuming leaves, stems, shoots, roots, tubers, and fruits. Pill bugs can be serious pests in certain agricultural systems, particularly in areas that are prone to heavy rains and flood conditions. Pill bugs will feed on numerous crop plants including corn, beans, squash, peas, melon, chard, beet, cucumber, potato, spinach, lettuce, and strawberry, with potential for significant yield loss in strawberry in particular. (wikipedia)

JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS		20ml	40ml
JWA		200ml	300ml
JHS		400ml	500ml
JMS			
NaOH			40g
Fine soil			
Control interval	10days	**Visible effect**	2~3days

- JADAM solution effectively controls this pest.
- This pesticide is used for soil irrigation.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(wikipedia)

(Franco Folin wikipediai)

(wikipedia)

Garden springtail

Bourletiella hortensis

Description

Body length is around 1~1.5mm. And its primary host plants include but are not limited to Chinese cabbage, radish, beans, cotton, cucumber, eggplant, and tomato.

Life cycle

Although it is similar to the species known as Bourletiella pruinosa, it is classified according to the insects size and shape, But research on this has not been appropriately done in Korea.

Damage

It damages the crop's young roots and leaves, making small round holes, which become larger as the crop grows. In Korea, it occurs a lot in spring, and in particular, it causes significant damage to cruciferous crops. It occurs several times a year at irregular times. As an adult insect, it winters among soil lumps and damages crops after April.

(Deogkee Park)

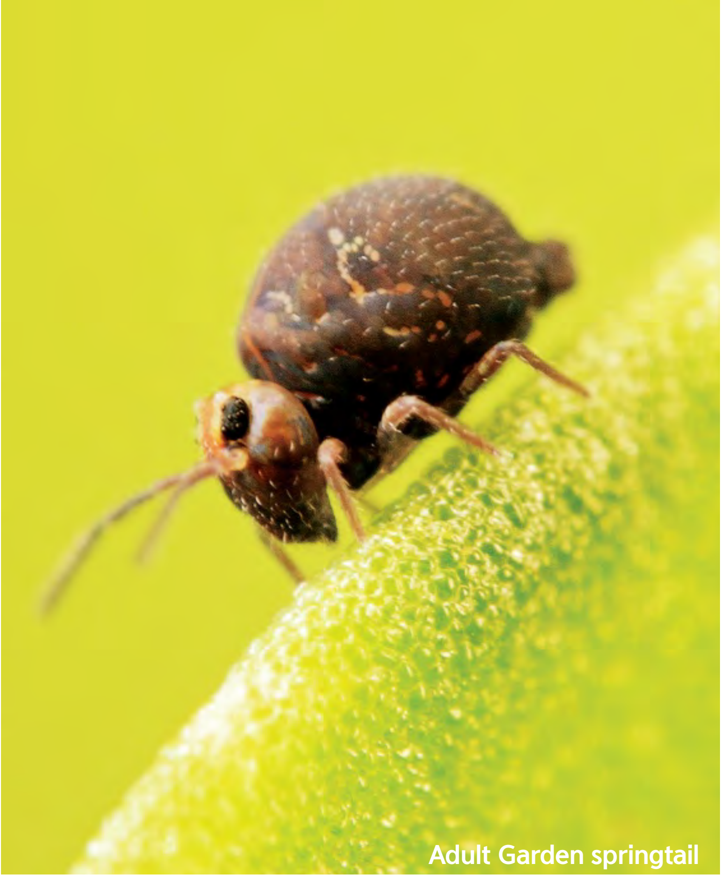
Refer to pages 25, 35~37

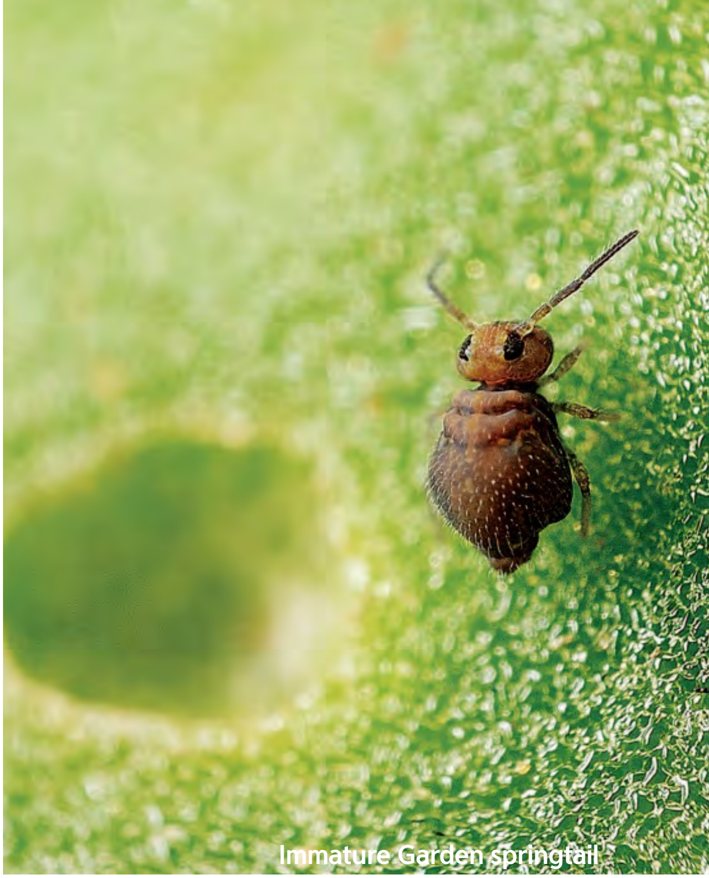
JADAM Natural Control Ratio

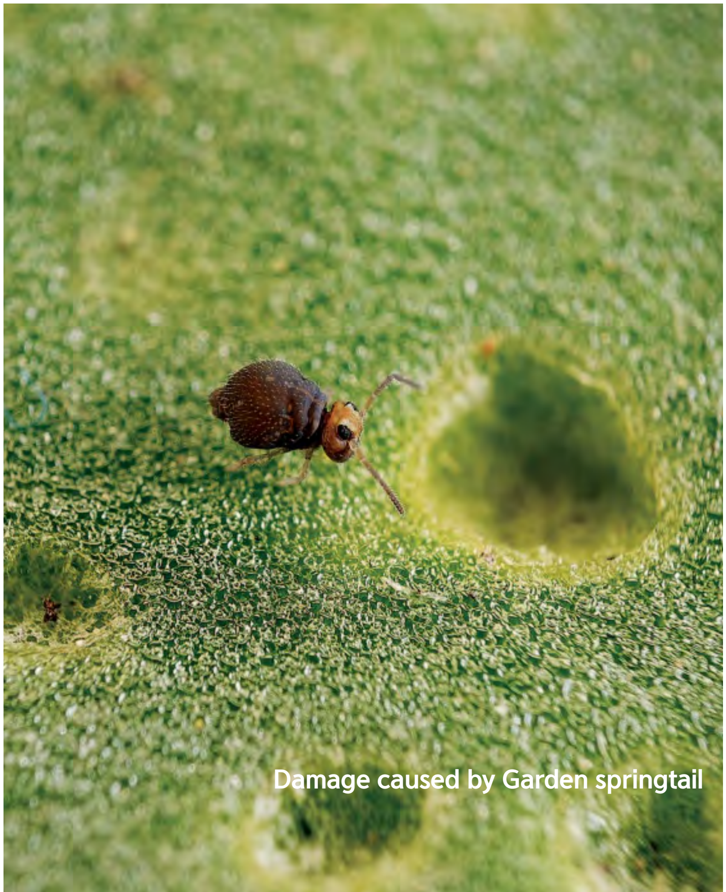
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			40g
Fine soil			40g
Control interval	7days	**Visible effect**	1~2days

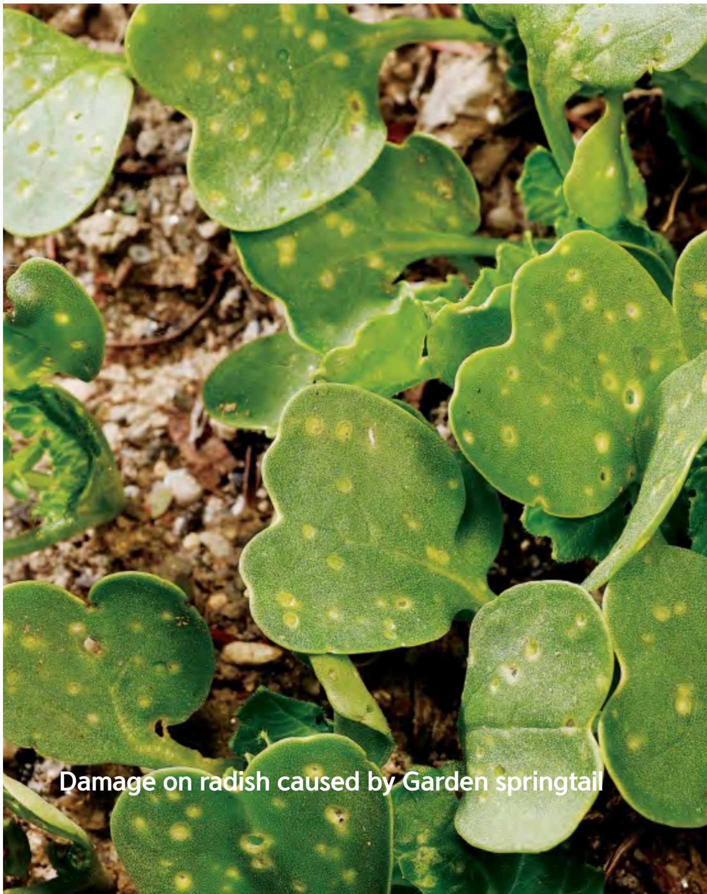
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide(NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Adult Garden springtail


Immature Garden springtail


Damage caused by Garden springtail


Damage on radish caused by Garden springtail

Snails, Slugs

Slug

It is a shell less snail belonging to the gastropod class. The body length is 4-5cm, and the body width is about 1cm. The shell degenerates and disappeared, and a light brown coat covers the back. The breathing hole is open on the front right. There are 3 horizontal black lines from head to tail. Black spots are irregularly spread throughout the body, and the lower feet are grayish-white. Two pairs of antenna (tactile sensors) on the head are like horns, they can freely stick out or hide, but the back one is longer than the front one, and there are eyes in it. In addition, the first pair has an olfactory organ. It is hermaphrodite, lays about 40 white round eggs in early summer, fully matures in about a year, and lays eggs and dies the following year.

Snail

It belongs to the gastropod class which contains about 20,000 species in the world. Because snails have poor mobility, the population is isolated by region, resulting in many subspecies. The large size (shell height of 100mm) Achatina achatina and the shell height of about 1mm Valononia costata, while the large snail living in Brazil is about 27mm long and about 12mm in diameter.

There are many snails with beautiful shells in the tropics, among which the five-colored snails inhabiting Cuba are famous. In the Bismarck Islands, the green Papua snail is known for its transparent green color, and Euhadra senckenbergiana is known in Japan.

Damage

It harms most crops but mainly damages vegetables and flowers grown in greenhouses such as lettuce, cabbage, and strawberries. Damage symptoms, like slugs, gnaw, or hurts the leaves, flowers, and fruits of a crop, reducing yield and product value, and in particular, transmitting pathogens such as gray mold disease. In addition, it decreases the marketability due to the traces of mucous secretions. (Doosan Encyclopedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		300ml	500ml
JHS			
JMS			
NaOH		40g	60g
Fine soil			
Control interval	If necessary	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- Soft water increases the control effect.
- It's a very simple combination of pesticides, but it works great.
- Add about 40ml of JS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Youngsang Cho)

(Zachi Evenor, wikipedia)

(Msmurugan1, wikipedia)

(Youngsang Cho)

Apple blossom weevil

Anthonomus pomorum

Description

The body length of the apple blossom weevil adult is around 0.5 cm. Its eggs are egg-shaped and red. Its larva is long cylindrical and light red yellow. The edge of both sides are very thin. Its bottom part is cone-shaped and its head is red-brown. Its chest is light yellow.

Life cycle

Adult insects winter in the bark and occur once a year. In mid-April of spring, it flies as a flower bud and lays eggs in it. About a week later, the larvae awake from the cocoon, wrap the petals and gnaw plant stamens and ovaries. It becomes a pupa in mid-late May and emerges in early mid-June to become an adult.

Damage

Around the middle of April, the adults move out of the place where they stayed the winter and go to a bud. It spawns inside the bud. When it hatches, it starts to nibble stamen and ovaries. The bud becomes brown and dies or the flower leaves are bounded with something like web. It appears only in apple and pear orchards. It is easy to find around malus prunifolia and malus sieboldii where farmers use less or no pest control.

(National Crop Pest Management System/NCPMS)

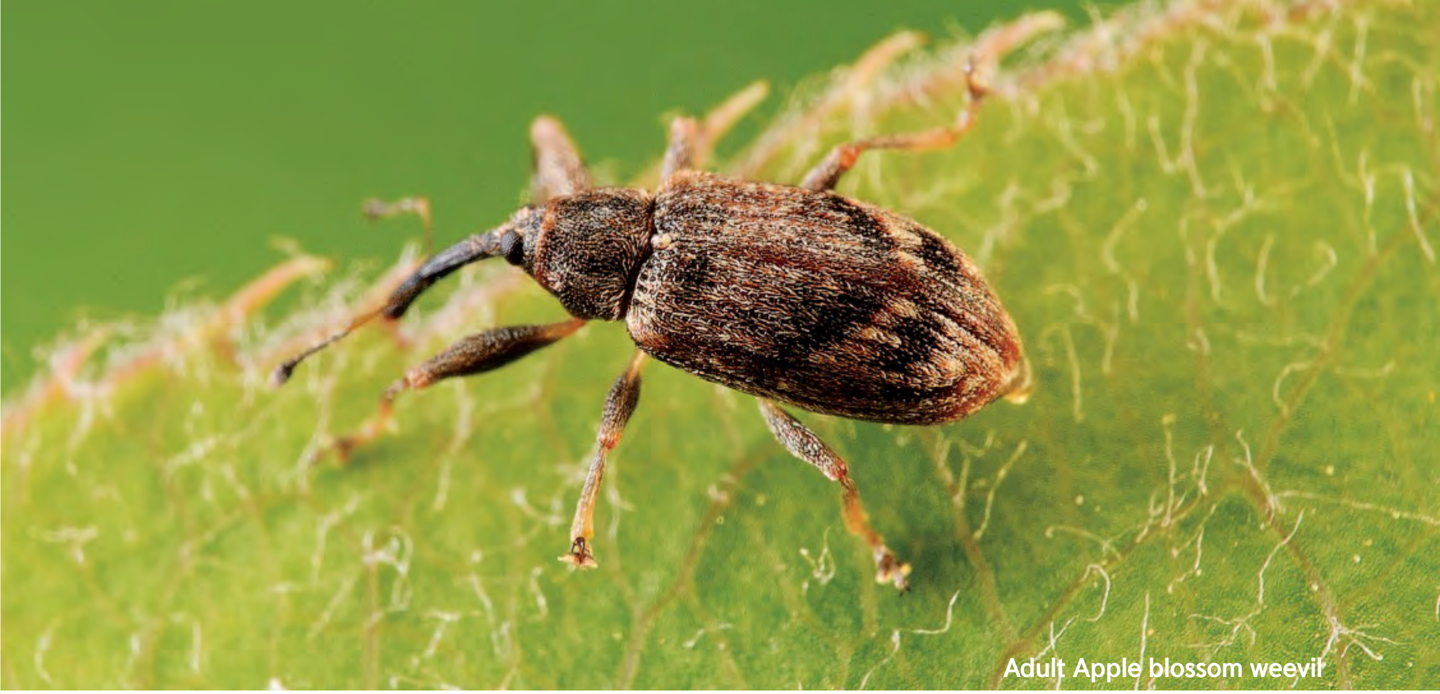
Refer to pages 25, 35~37

JADAM Natural Control Ratio

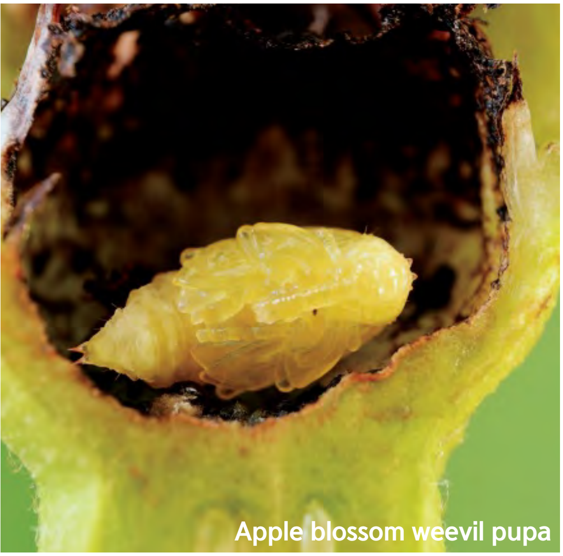
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil			40g
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

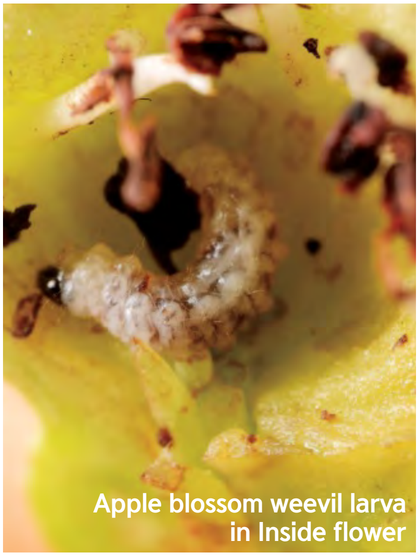
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



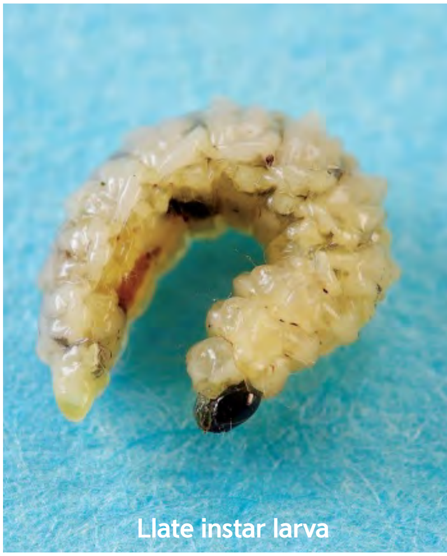
Adult Apple blossom weevil



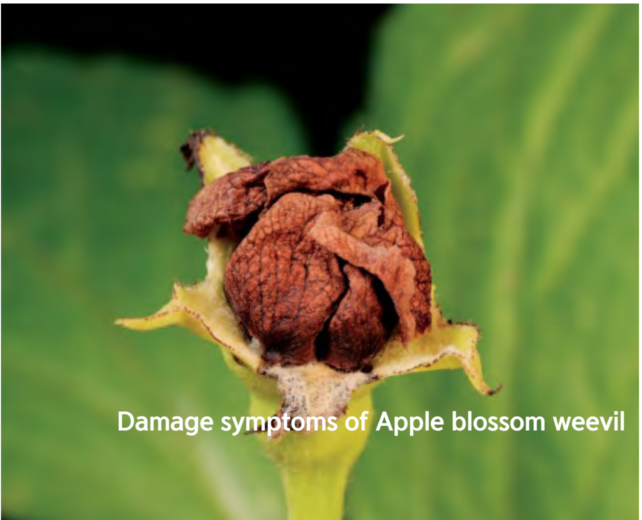
Apple blossom weevil pupa



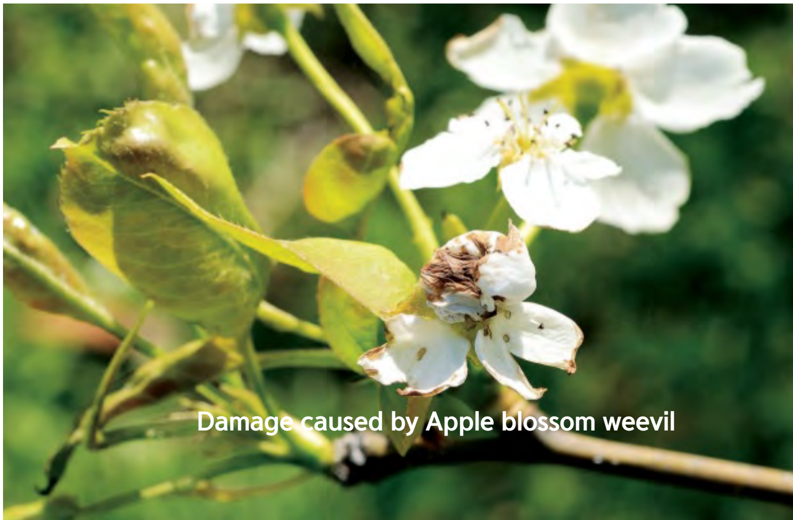
Apple blossom weevil larva in Inside flower



Llate instar larva



Damage symptoms of Apple blossom weevil



Damage caused by Apple blossom weevil

Lissorhoptrus oryzophilus

Description

The size of an adult insect is about 3mm, and there is an irregular large black pattern in the center of the back on a dark gray background, and the snout is elongated forward like an elephant.

Life cycle

It occurs once a year and winters in 1~5cm of the ground, mainly covered with fallen leaves at the foot of a mountain as an adult (with moderate humidity), and begins activity in late April, eating nearby weeds and moves to transplanted rice paddies in late May. Then they go above and below the water surface, gnawing rice leaves, and spawning in the leaves below the water.

The larva hatched from the eggs grow by gnawing on the rice's roots and become a pupa. The larval period is about 7 weeks (25°C), and the pupa period is 1-2 weeks. New adult insects occur from the beginning of July and mid-July, and their peak occurs in early August, after which they move to a place to spend winter.

Damage

Adults gnaw young leaves immediately after transplanting, inhibiting photosynthesis, causing damage, as well as gnawing rice roots. If the damage is severe, the number of stalks of rice decreases, growth is inhibited, and productivity is decreased.

(National Crop Pest Management System/NCPMS)

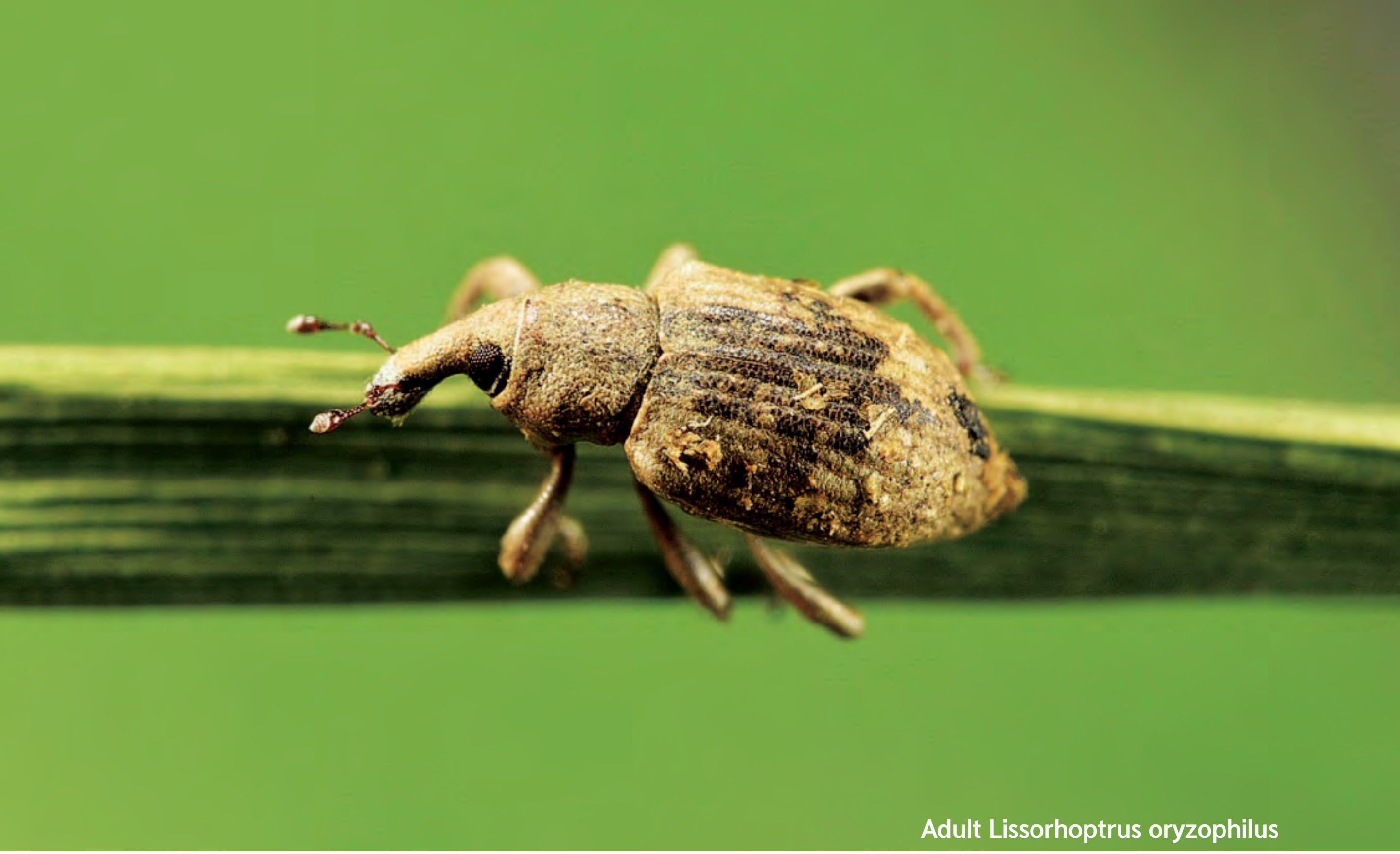
Refer to pages 25, 35~37

JADAM Natural Control Ratio

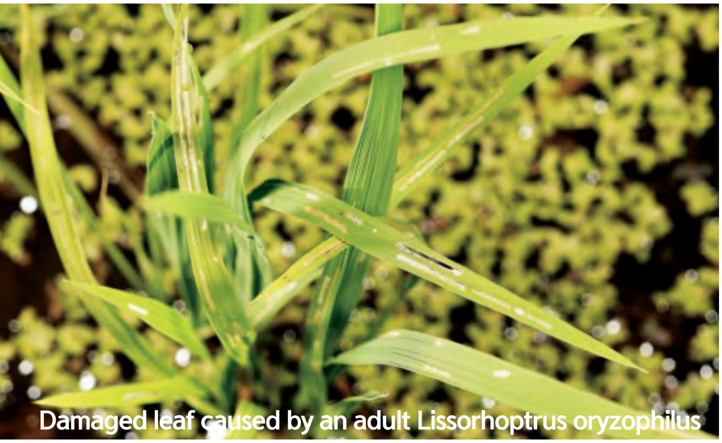
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil			40g
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- The combination of this table is a pesticide sprayed around paddy fields. For paddy fields with water, use JADAM Surface-Spreading Agent on page 66.

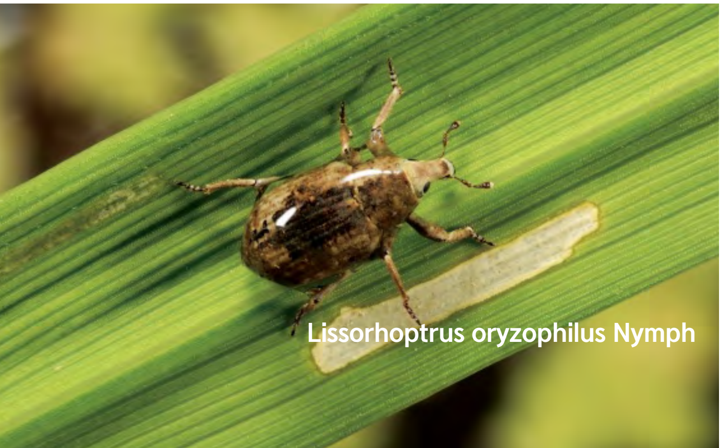
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



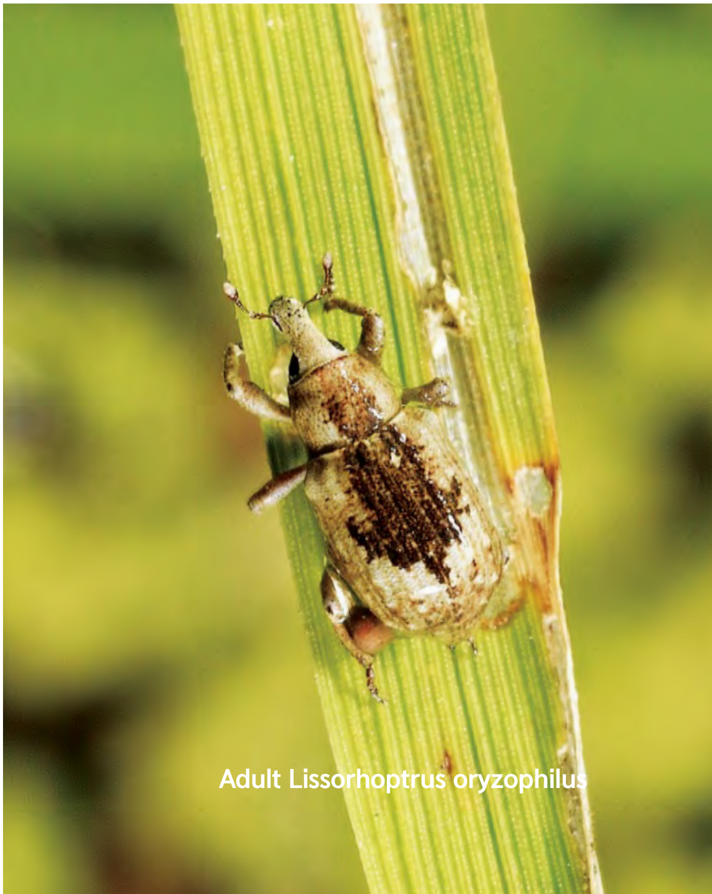
Adult Lissorhoptrus oryzophilus



Damaged leaf caused by an adult Lissorhoptrus oryzophilus



Lissorhoptrus oryzophilus Nymph



Adult Lissorhoptrus oryzophilus

Eurytomoa maslovskii

Description

The body length of adult insects is 6.97mm for females and 4.90mm for males, and females have a 0.64mm ovipositor (spawning organ), so the abdomen is large, the tip is sharp, and the shape of the antennae is also different, making it easy to distinguish between males and females with the naked eye. The egg is milky white, with a length of 0.68 mm and a width of 0.29 mm in a long oval shape with thread-shaped projections attached to both ends. The hatched larvae are milky white and ingest liquid endosperm, and the milky color becomes dark as they grow. The full-grown larvae are 6.56mm long and 3.18mm wide.

Life cycle

It occurs once a year and winters as a larva in the ovary of fruit. The next year, when the flower blooms, it passes through the pupa and becomes an adult, and the main activity time is between 7 am and 10 am. The adult insect lays one egg each in the young fruit using the ovipositor, and one adult lays about 100 eggs in total. The larvae hatch from the egg grow by gnawing on the ovary in the plum.

Wintering larvae become pupa from late March and are found until late April. Adult insects occur from early April to mid-May, and their peak season is in late April. Adults intensively mate and spawn between late April and early May. The female lays eggs by inserting a long ovipositor (spawning organ) into the seed before the fruit core hardens.

Damage

It harms plums, peaches, and apricots. Fruits that larvae have damaged grow brown, wrinkled, or depressed and fruiting begins before harvest. When the damage is severe, more than 90% of them are lost. The larvae eat endosperm from among the seeds of a drupe, such as plums and apricots.
(National Crop Pest Management System/NCPMS)

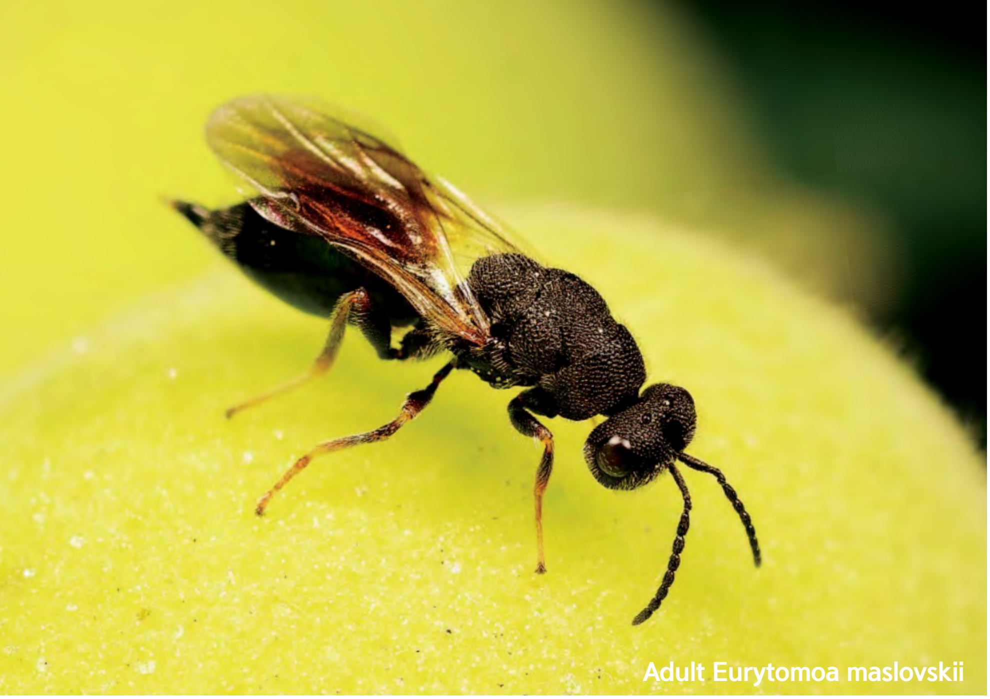
Refer to pages 25, 35~37

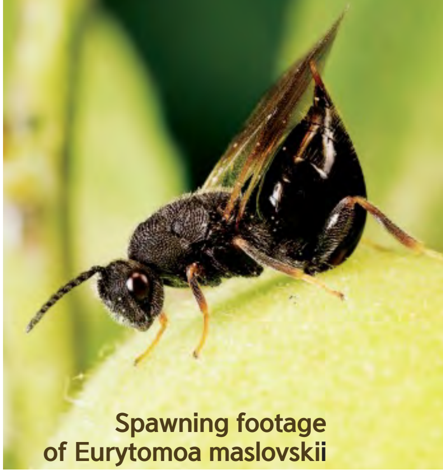
JADAM Natural Control Ratio

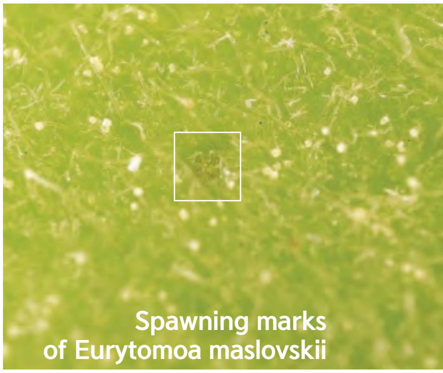
Standard (20L)	**Winter Control**	**Occurrence Time**	**Emergency**
JS	200ml		
JWA	400ml	400ml	600ml
JHS		400ml	600ml
JMS			
NaOH	60g		60g
Fine soil	80g		40g
Control interval	7days	**Visible effect**	10days

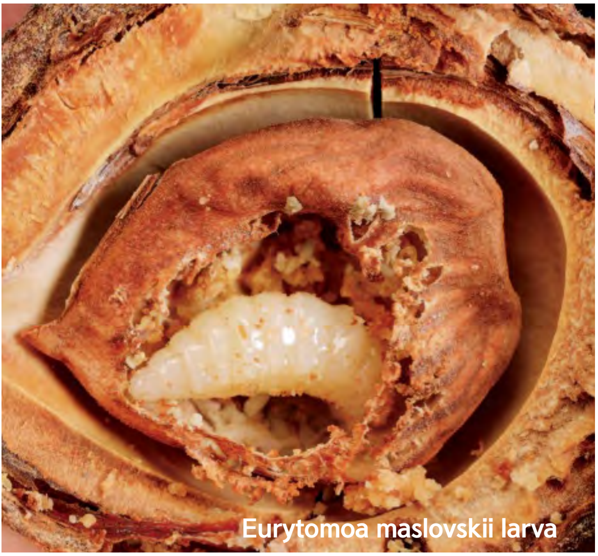
- Although the JADAM solution is effective, it is difficult to completely control it.
- Intensive control in early spring, when this pest occurs, can be effective.
- Soft water increases the control effect.
- JHS, made from ginkgo berries, is the most effective.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.

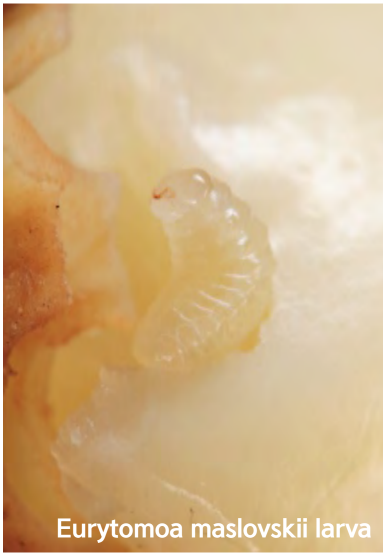
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

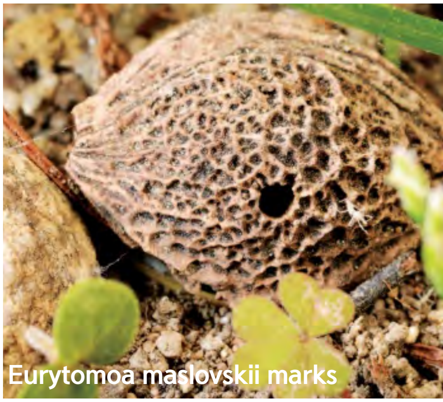

Adult Eurytomoa maslovskii

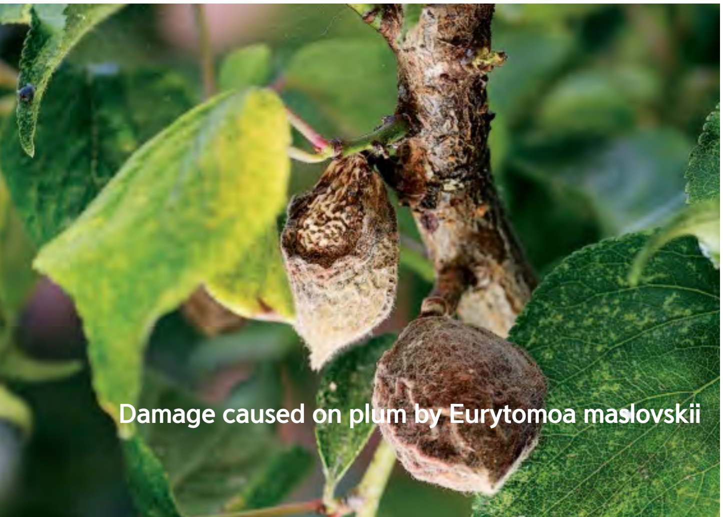

Spawning footage
of Eurytomoa maslovskii

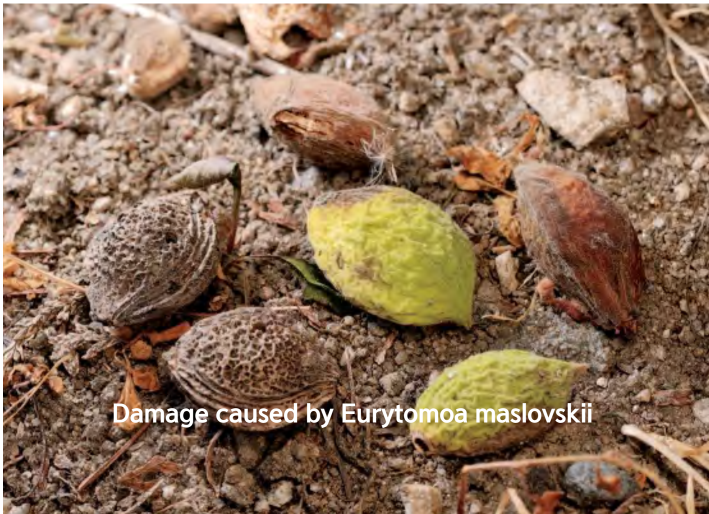

Spawning marks
of Eurytomoa maslovskii


Eurytomoa maslovskii larva


Eurytomoa maslovskii larva


Eurytomoa maslovskii marks


Damage caused on plum by Eurytomoa maslovskii


Damage caused by Eurytomoa maslovskii

Old world swallowtail

Papilio machaon

Description

The wingspan of an adult insect is about 10cm, and the young larvae are black to blackish green and have a white pattern, which makes them look like bird dung. When it becomes a 4th-5th instar larva, the blue-green-black and yellow-green band patterns are arranged, and the color is very fine. When the larvae are touched, a yellow bump protrudes from the thorax joint's back to releases a peculiar smell.

Life cycle

They have 2-3 generations per year, but an outbreak is irregular because the pupa period is not constant. In the subtropic region, four generations can occur. It winters as a pupa, and adult insects of the wintered generation appear in April-May, and adult occur in June-July and August-September. Adult insects spawn one by one on a leaf during the day, and mature larvae become pupa after tying their body to a petiole or dry leaf with thread.

Damage

The larvae eat the leaves of host plants, such as carrots and celery. There are not many incidences, and at first, the amount of feeding is small, but as it grows, It eats the host leaving only leaf veins, stems, and harms the flower.

Usually, the occurrence is lesser compared to other pest, and damage is mainly found in mountainous areas. There is a lot of But the damage becomes severe during late spring and early autumn. (National Crop Pest Management System/NCPMS)

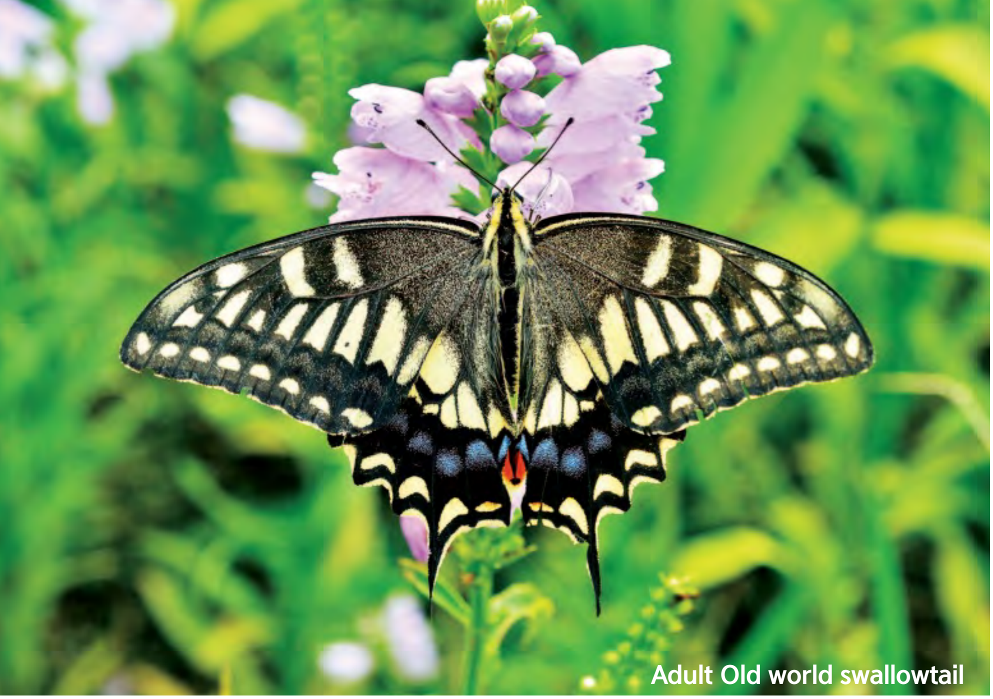
Refer to pages 25, 35~37

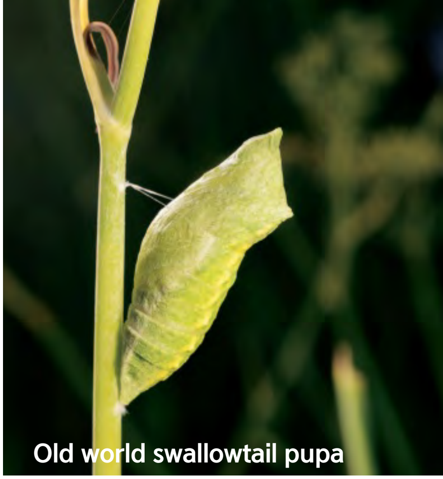
JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH			60g
Fine soil			40g
Control interval	10days	**Visible effect**	30 minutes

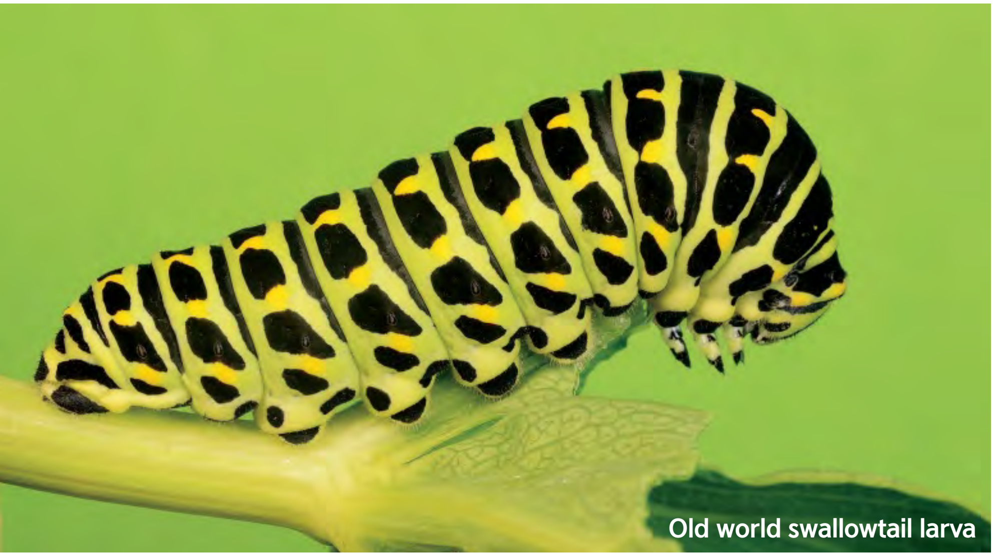
- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

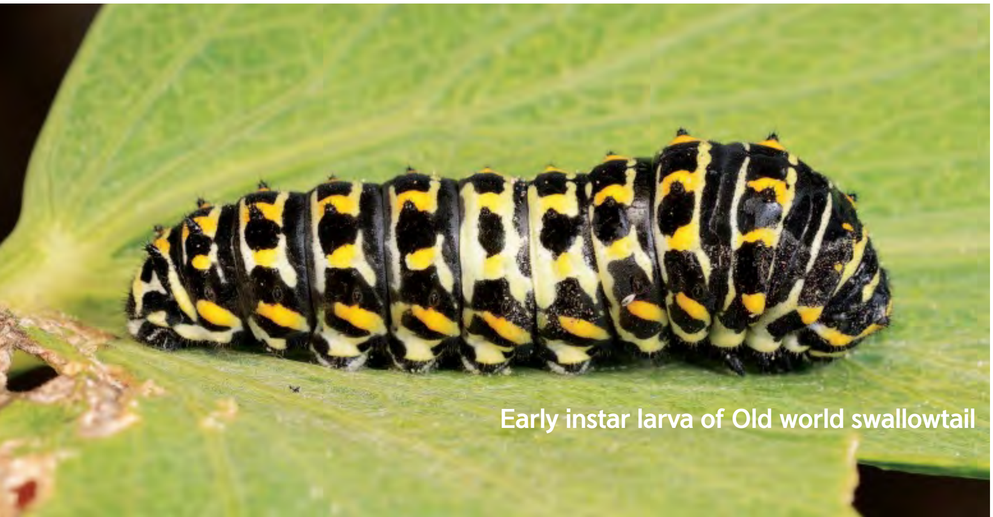

Adult Old world swallowtail


Old world swallowtail pupa

Damage caused by Old world swallowtail larva


Old world swallowtail larva

Damage caused by the larva


Early instar larva of Old world swallowtail

Coffee berry bore (CBB)

Hypothenemus hampei

Description

The coffee borer beetle or coffee berry borer (Hypothenemus hampei) is a small beetle native to Africa. It is among the most harmful pests to coffee crops across the world where coffee is cultivated. Females have two larval stages and males only one. They have strong mandibles, and their larval phase lasts 10 to 26 days. The adults are small black beetles, females are 1.4–1.8 mm long, the males are 1.2–1.6 mm long. Female beetles can fly short distance, males have rudimentary wings. H. hampei is confused sometimes with the false coffee berry borer (H. obscurus or H. seriatus) and Xylosandrus (Scolytidae), but these species do not enter the coffee bean endosperm.

Life cycle

The maturation of the insect (from egg to adult) lasts between 24 and 45 days, Usually, the female drills the berry through the central disc, although it can enter through the side walls if the fruit is dry. Two days after the access, the beetle lays 35–50 eggs, which produce 13 females for each male. The lifespan for females is 35–190 days and for males 40 days. The new insects mate inside the seed. Some females lay the eggs in the same coffee plant, others colonize new ones. The males never leave the fruit.

The same plant can host three to five generations of beetles. Up to 100 beetles can be found in a single fruit. The insect is very sensitive to desiccation, and waits for the rains to leave the fruit. The most affected areas for crops are shady and moist.

Damage

The female beetles attack the fruits 8 weeks past the flowering, up to 32 weeks. When the insect enters, it builds galleries in the endosperm where the eggs are deposited. The presence of the insect affects the economy of over 20 million families that depend on the coffee harvest. Due to the losses in yield and quality caused by the insect, growers end up losing significant amounts of income. (wikipedia)

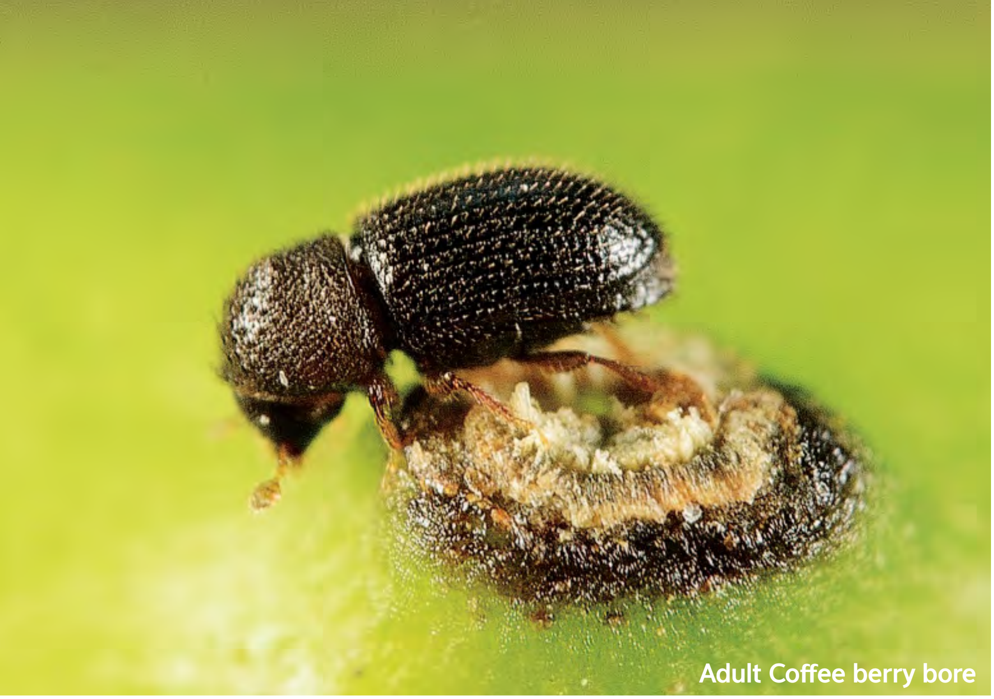
Refer to pages 25, 35~37

JADAM Natural Control Ratio

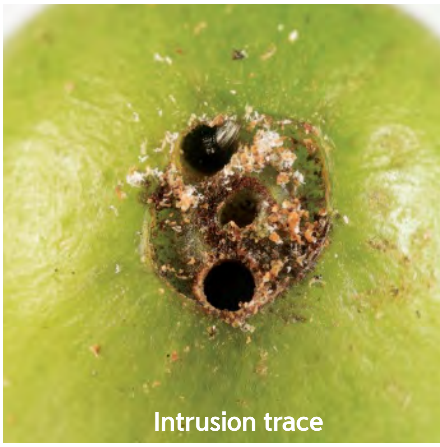
Standard (20L)	After harvest	Occurrence Time	Emergency
JS	60ml	30ml	40ml
JWA	400ml	400ml	500ml
JHS			
JMS			
NaOH	60g	40g	60g
Fine soil	80g	40g	60g
Control interval	10days	**Visible effect**	1 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

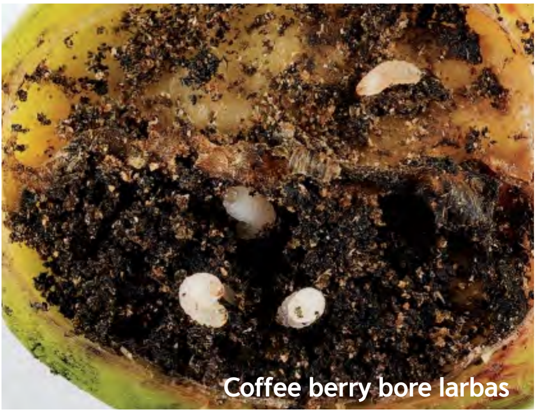
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



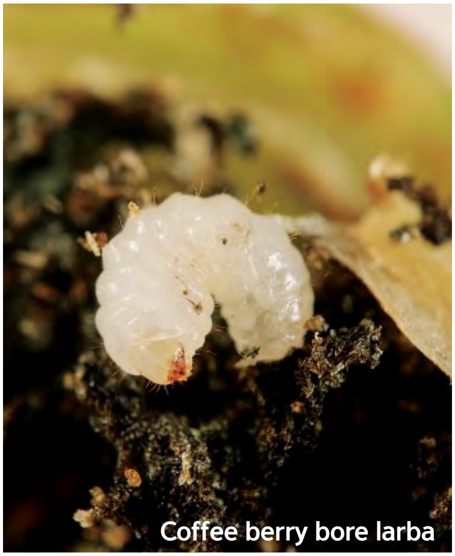
Adult Coffee berry bore



Intrusion trace



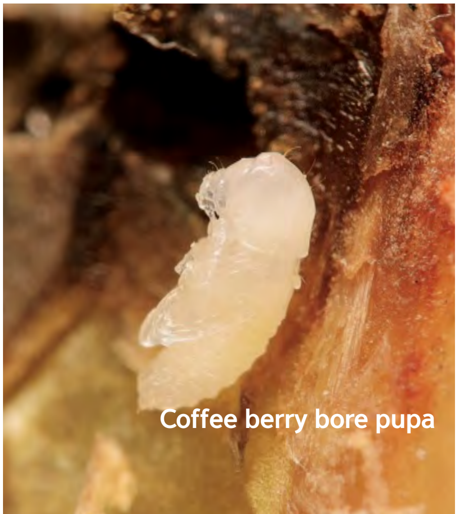
Coffee berry bore larbas



Coffee berry bore larba

Youngsang Cho discovered CBB's break-through control method in Huawai.

NATIONAL
GEOGRAPH



Coffee berry bore pupa

Soil nematode

Description

The body is cylindrical, the ends are sharp, and the body length is about 1mm on average. The body shell epidermisare is covered with a layer of chitinous keratin, and a muscle layer is developed under the epithelium. Moreover, various organs in the body are responsible for digestion, reproduction, nerves, and excretion. Collect the soil and put it in a fine-mesh while washing in water to capture them. The observation requires an optical microscope. The kinds that live freely in the soil eat germs, molds, and rotting organic matter.

Life cycle

The nematodes are divided into corrosive nematodes and parasitic nematodes. In the early stage of the study, there were Meloidogyne spp, Pratylenchus spp., Ditylenchus spp, and Aphelenchoides spp. However, now studies focus on classifying nematodes that harm plants or are harmless to plants.

The criteria for this classification are according to whether there is a needle in the nematode's mouth. The soil nematodes are observable with a magnification of about 30 times under a microscope. However, it is not enough to look inside the nematodes. So, by taking out the nematode and enlarging it about 400 times, there is something like a black needle in the mouth, called a stylet.

(Dr. Hong Seok-il)

Damage

Hundreds of species are known to be parasitic on plants, and they live on roots, stems, leaves, flowers, and fruits. When they are parasitic to crops, some of them cause lumps on the roots of tomatoes, carrots, sweet potatoes, tobacco, and apple trees and rot the roots of radish, burdock, potatoes, chrysanthemums, and peach trees, there are some that dry the leaves of chrysanthemums, some of which prevent the succession of mono-cropped beans. The damage of soil nematodes has emerged as a big problem in agriculture.

(Dongro Choi, Sangchan Han)

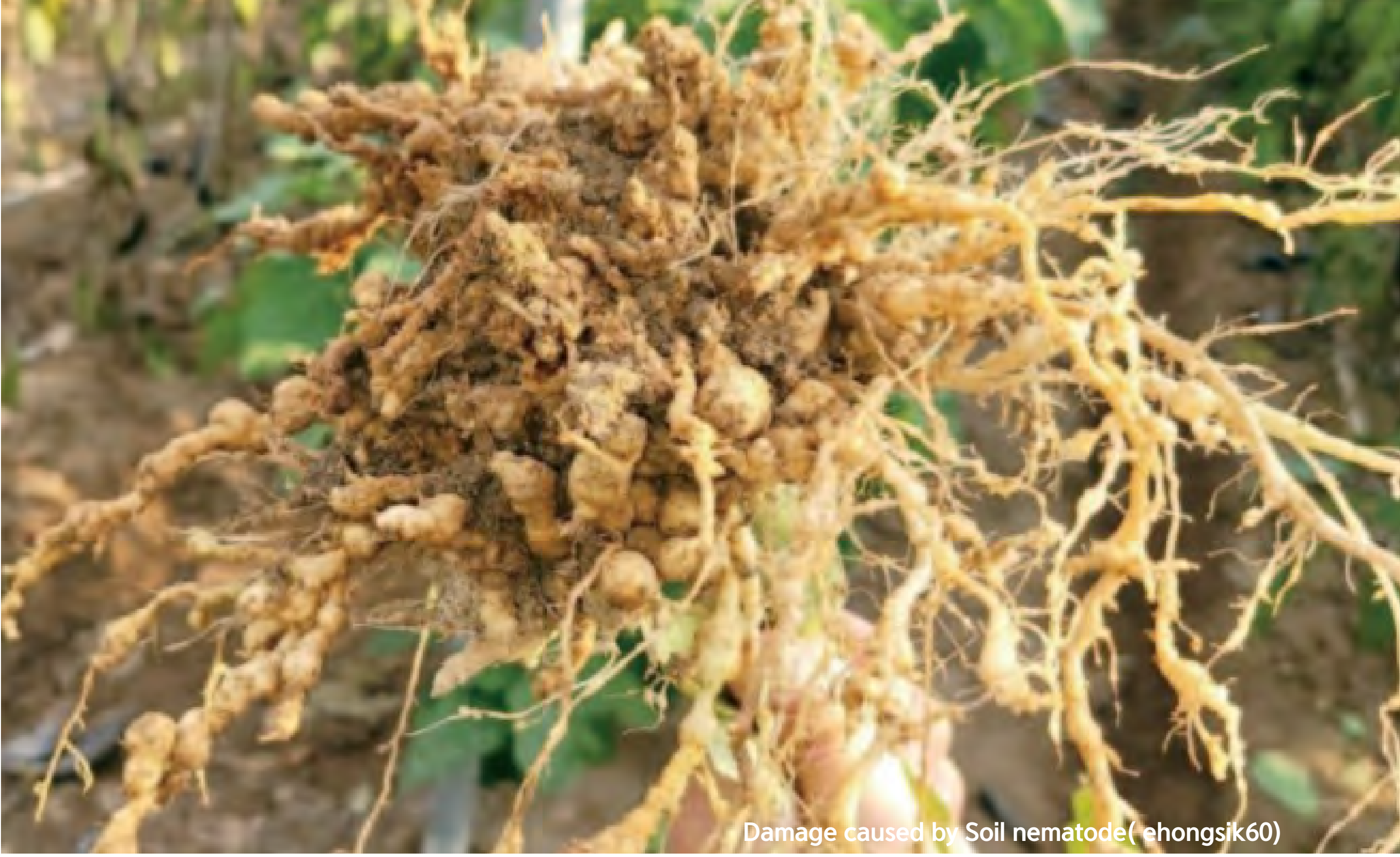
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA			
JHS			
JMS	2000ml	2000ml	
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	10days

- Frequent irrigation of JMS before planting crops and frequent use of JMS during cultivation can prevent disease occurrence in advance. Diseases can be prevented when a lot of various microorganisms live in the soil.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Damage caused by Soil nematode(ehongsik60)

Damage caused by Soil nematode(ehongsik60)

Nematode(wikipedia)

Damage caused by Soil nematode(hic1090)

Papaya mealybug

Paracoccus marginatus

Description

The adult female has a yellowish segmented, flattened oval body about two millimeters long covered with mealy wax. There are a number of short waxy filaments projecting around the margin. Sometimes the wax looks like cotton wool and oozes drops of fluid. The adult male is pinkish and about one millimeter long, with well-developed wings each marked with a small basal vein.

This species is believed to be native to Belize, Costa Rica, Guatemala and Mexico. They have spread to certain Caribbean Islands, Hawaii and French Guiana, and also to parts of Southeast Asia, including India, Indonesia and Thailand. It was discovered in Bradenton, Florida, in the United States in 1998 feeding on hibiscus, and four years later it had been detected on eighteen different plant species in the US.

Life cycle

The papaya mealybug feeds on over 55 plants in more than 25 genera. Economically important host plants include papaya, avocado, citrus, mango, cherry and pomegranate, as well as hibiscus, cotton, tomato, eggplant, peppers, beans, peas and sweet potato. The adult female deposits up to 600 eggs into her ovisac over a period of one to two weeks, the eggs hatch ten days later and the crawlers, which resemble miniature versions of the adult female, disperse.

Damage

The papaya mealybug inserts its stylet into the epidermis of the leaf or the skin of fruit or stem and feeds on the plant sap. At the same time it injects a toxic substance into the plant which results in chlorosis, distortion, stunting, early leaf and fruit fall, the production of honeydew, sooty mold and possibly the death of the plant. (wikipedia)

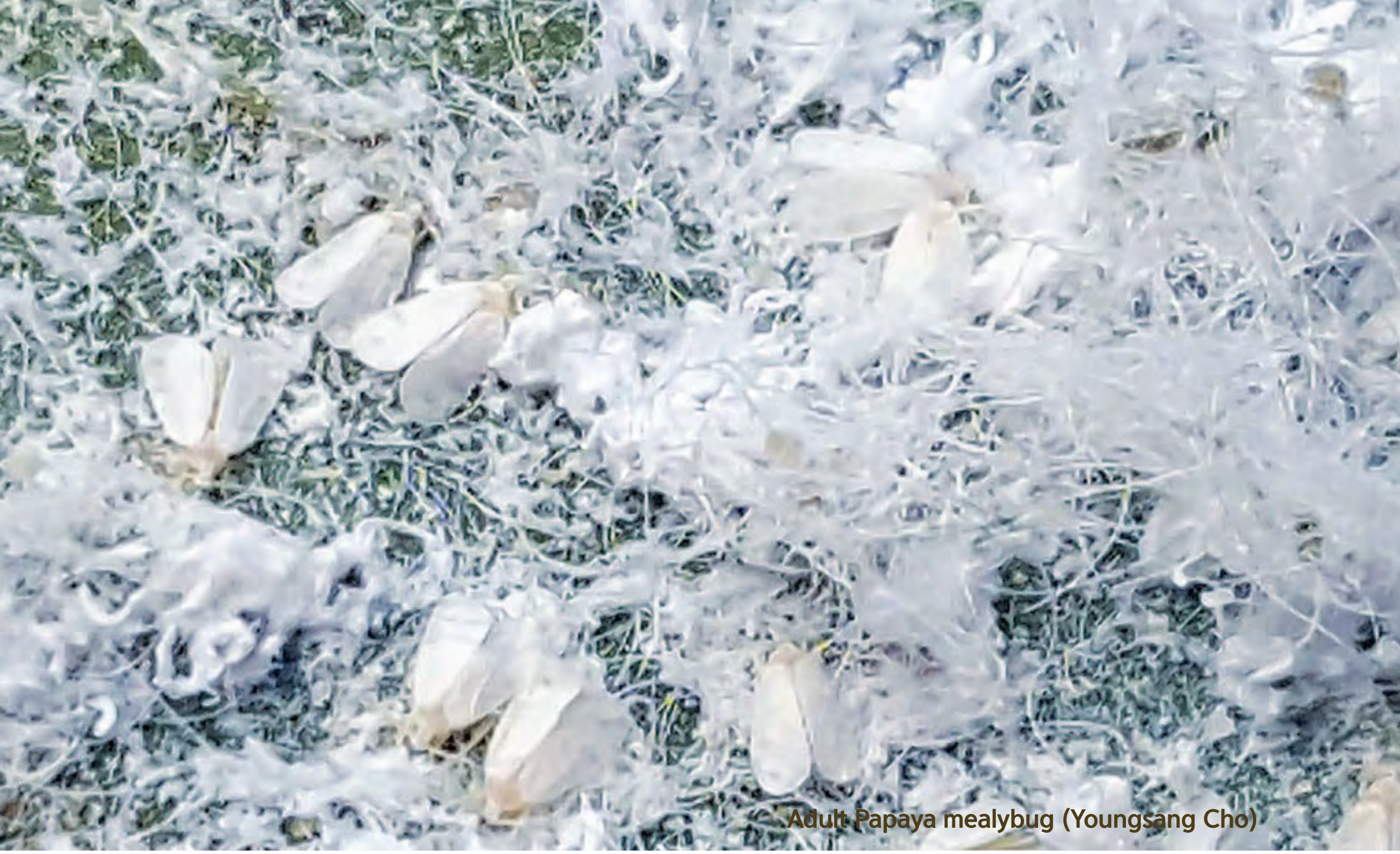
Refer to pages 25, 35~37

JADAM Natural Control Ratio

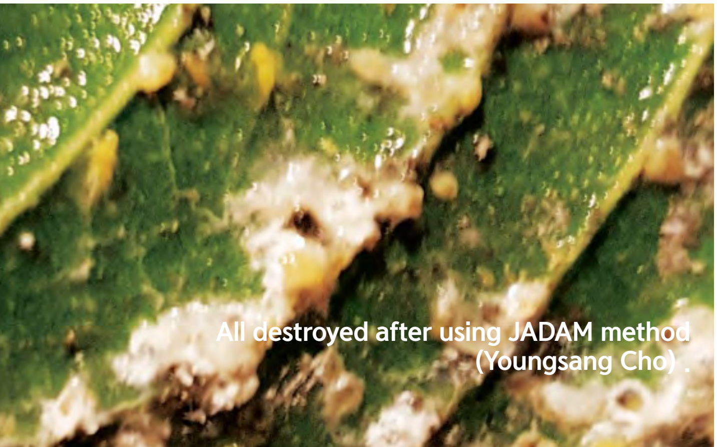
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	500ml
JHS			
JMS			
NaOH		40g	60g
Fine soil		40g	60g
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Adult Papaya mealybug (Youngsang Cho)



All destroyed after using JADAM method (Youngsang Cho) .

Asian yellow swallowtail

Papilio xuthus

Life cycle

It overwinters as a pupa and occurs 2-3 times a year. Females lay one egg each on the back of leaves or stems of trifoliate orange, Tangerine, and Mastic-leaf prickly ash. The first generation is from mid-April to late May, the second generation is from early June to late July, and the third generation is in August. It occurs from the end of the month to the beginning of October, and the first generation is called the spring type, and the second and third generations are called the summer type.

Damage

The larva gnaws the leaf, but the damage is not so significant, and damage happens more on the young tree than the adult tree.

(National Crop Pest Management System/NCPMS)

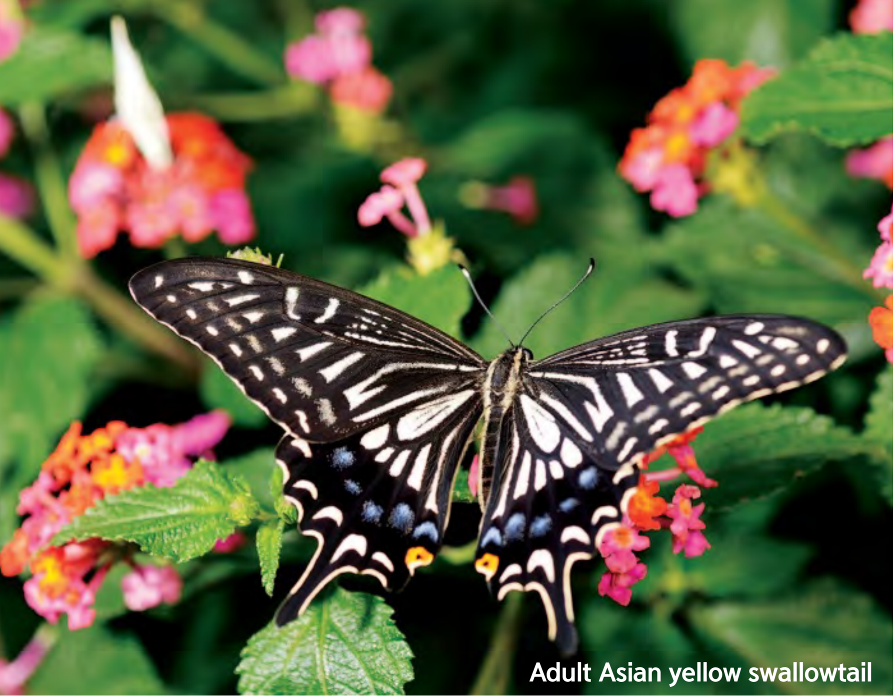
Refer to pages 25, 35~37

JADAM Natural Control Ratio

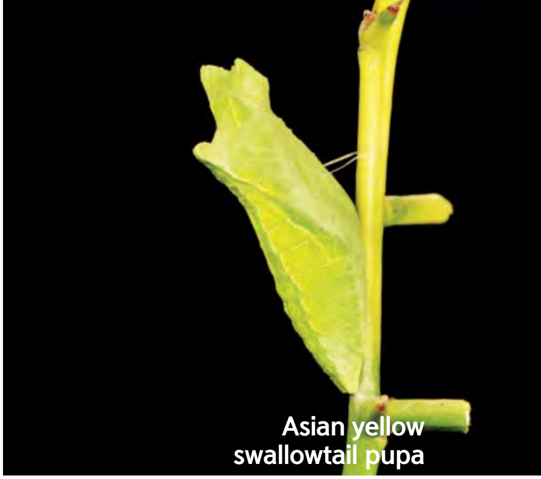
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	600ml
JHS		400ml	600ml
JMS			
NaOH		40g	60g
Fine soil			40g
Control interval	10days	**Visible effect**	30 minutes

- JADAM solution effectively controls this pest.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- You can use sodium hydroxide (NaOH) about 50g instead of JHS.
- Add about 40ml of JS, and it becomes a germicide & insecticide.
- Be careful of concentration damage when using JS.

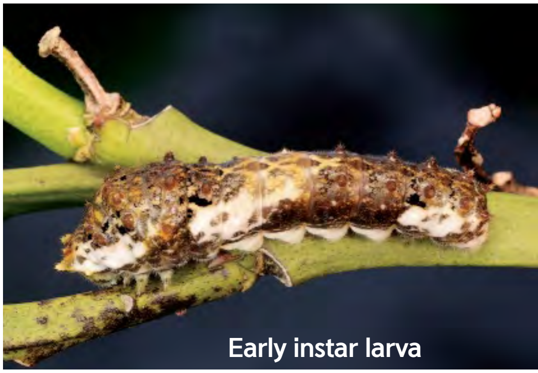
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



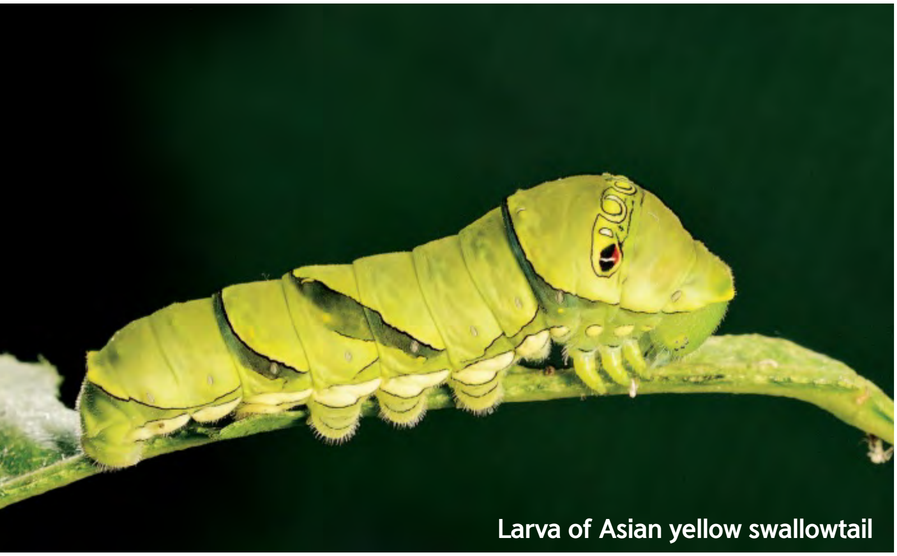
Adult Asian yellow swallowtail



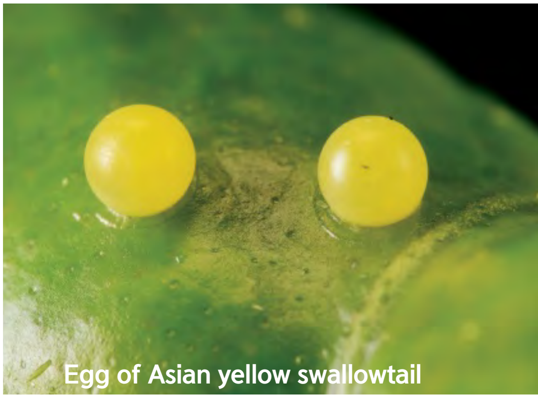
Asian yellow
swallowtail pupa



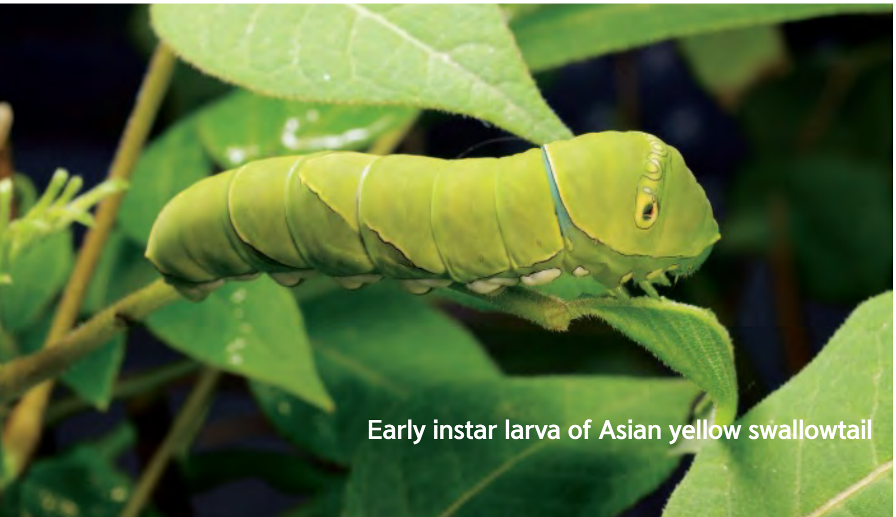
Early instar larva



Larva of Asian yellow swallowtail



Egg of Asian yellow swallowtail



Early instar larva of Asian yellow swallowtail

Natural enemies
Beneficial insects

In a broad sense, natural enemies are the predators located on the top of the food chain. It kills and damages other organisms. All living things in nature usually have natural enemies and play a role in preventing other organisms' unlimited reproduction. Therefore, there is balance in nature.

In insignificant pests, powerful natural enemies always moderately inhibit their reproduction and prevent them from becoming a major pest. In the case of pest control, try not to kill natural enemies as much as possible. It is better to increase the activities of natural enemies. To increase its activities, it is important to maintain the natural enemies' environment; consider the substitutive hosts, plant a host plant which produce honey and install a possible safe wintering place to live such as wood palisades.
(Agrifood Encyclopedia)

Betasyrphus serarius

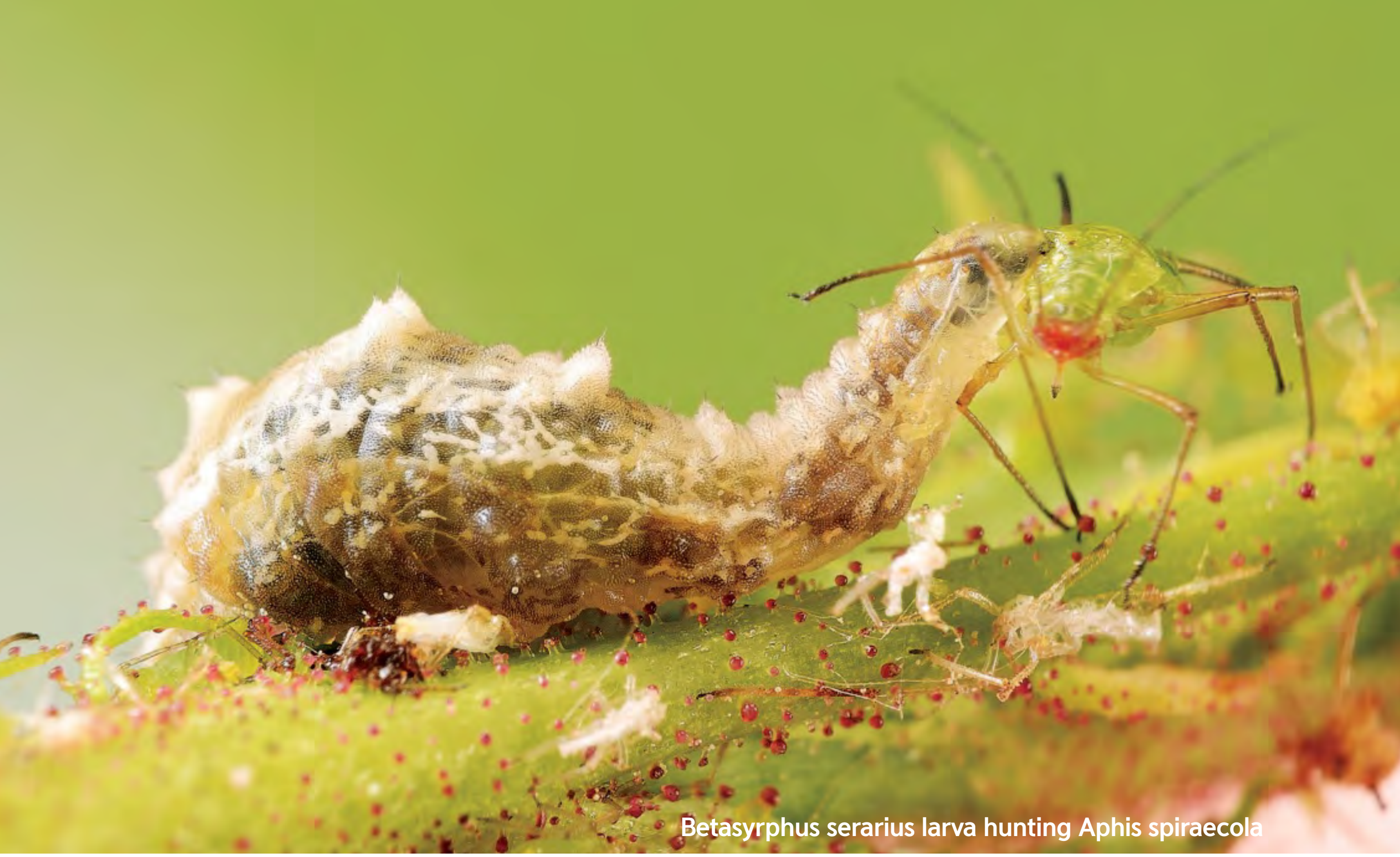
Description

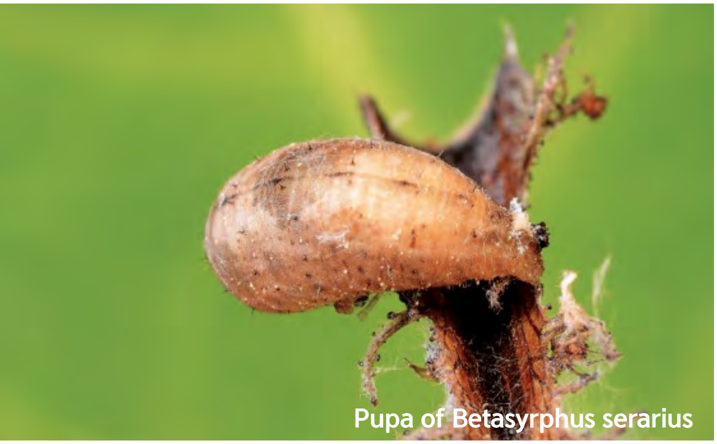
The host is an aphid. The body length of adult insects is 10~12mm. The body is black, and the compound eyes in between the head is about 1/5 of the head's width, and there is a large pattern of gray-white powder on the front half. In males, the junction of compound eyes are long. The forehead projections are large and distinct, and the sides are covered with grayish-white or grayish-yellow powder. The face is light sulfur color, with white powder sparsely distributed and dark brown hairs. The middle protruded part is small but clear, dark brown, and the antenna (tactile sensor) is dark brown, relatively large, the third segment is longer than the combined two segments, and the tip is slender.

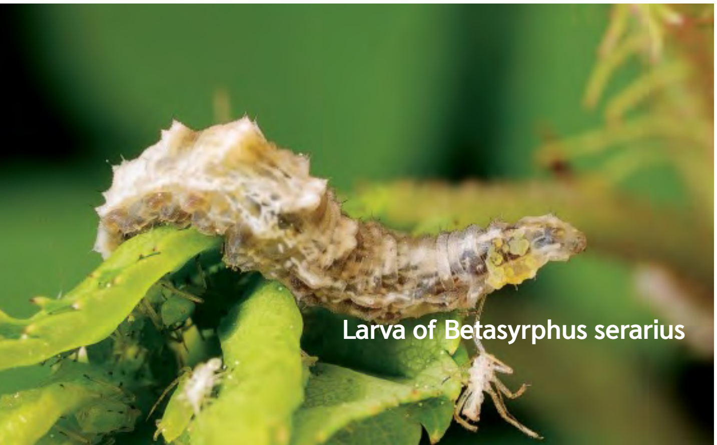
The prothorax is coppery black at the lateral edge, and the small pronotum is large and light sulfur color. The wings are transparent but matte, the legs are thin, reddish-brown to yellowish-brown, and the base is dark brown. The abdomen is long, wider in females, The first abdominal segment is bluish-black and has a metallic luster. The second to fourth abdominal segments have yellowish-red thin horizontal bands covered with white powder. These horizontal bands are cut off at the center, but the white powder is continuous.

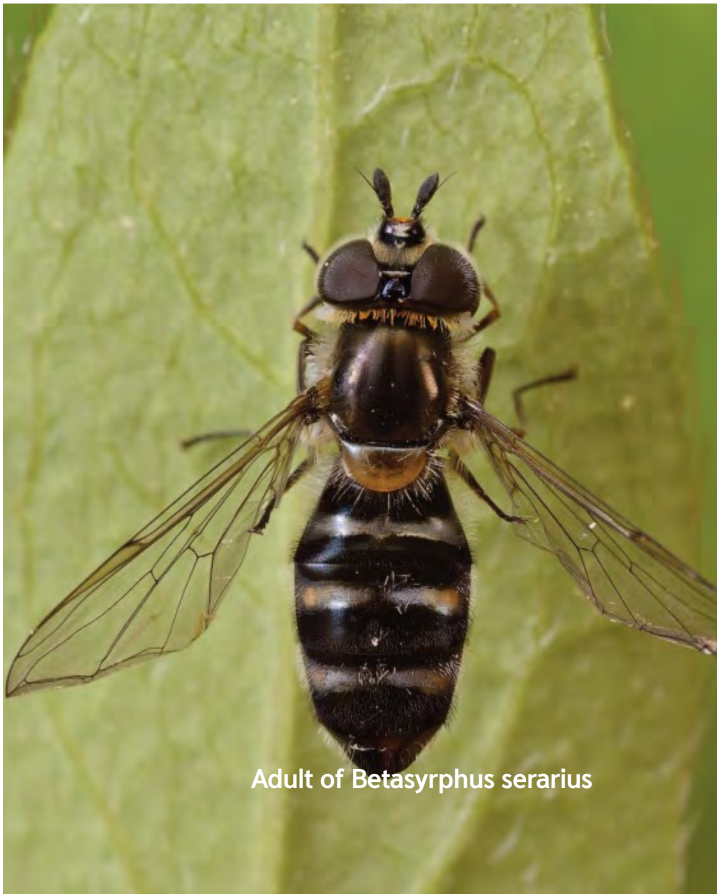
Life cycle

It has been reported to prey on various types of aphids during the larval period.
(KOREA FOREST SERVICE)


Betasyrphus serarius larva hunting Aphis spiraecola


Pupa of Betasyrphus serarius


Larva of Betasyrphus serarius


Adult of Betasyrphus serarius

Diglyphus isaea

Description

This species is an ectoparasitoid that paralyzes the leaf miner larva by injecting poison. It spawns one or more eggs next to its paralyzed host. After hatching, the larvae feed on host insects from the outside to grow. It is one of the well known types of natural enemy insects. It was introduced in the early 2000s for biological control and has been used for several years in the subtropic region. Adult Diglyphus isaea is often observed in greenhouse and field crops.

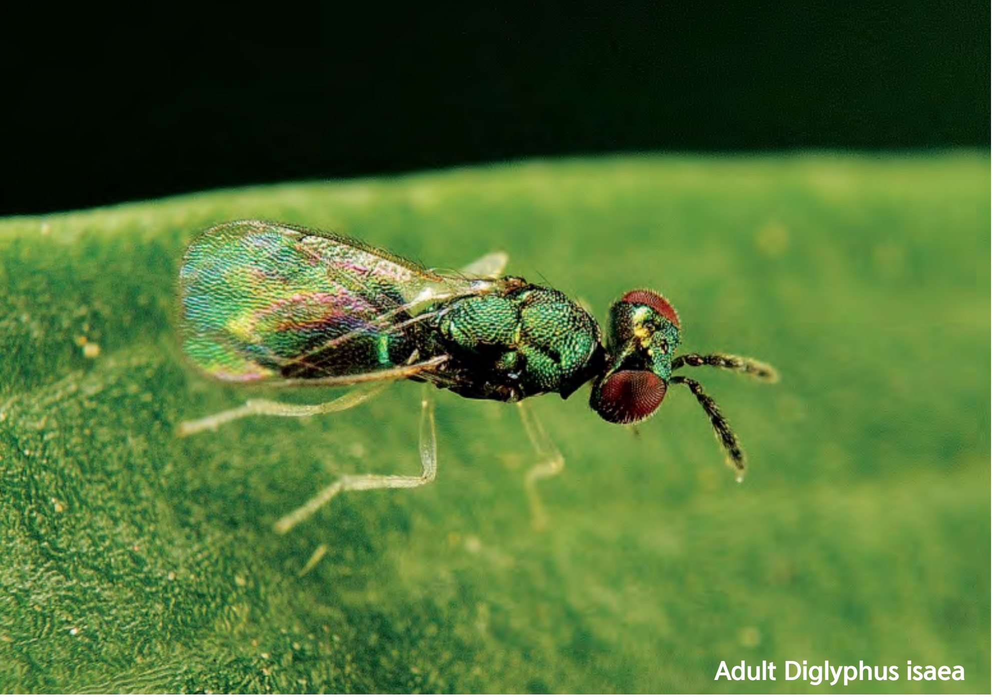
Types of parasitic insects fall into two categories according to their lifestyle. The internal parasitic insect spawn inside the host body by inserting an ovipositor (spawning organ) into the host body, while the parasitic larva approach the host body and ingest bodily fluids externally.

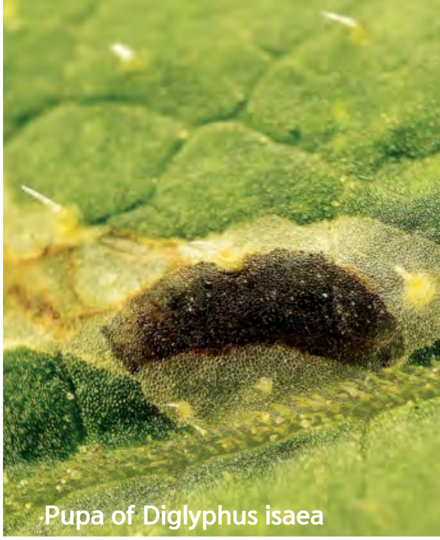
The Diglyphus isaea is 2~3mm in size and is widely distributed in Asia, Europe, and North America. It is an external parasitic natural enemy that attaches eggs to the second and third instar leaf miner's eggs.

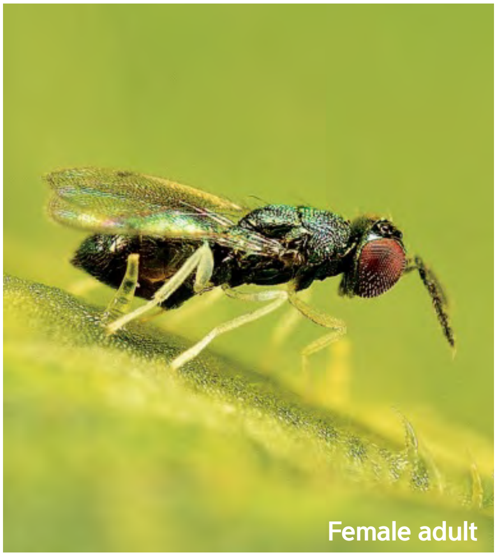
Life cycle

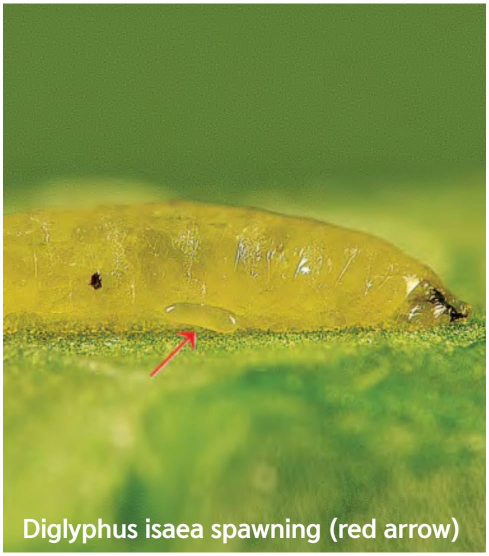
It goes through the stages of development of eggs, larva, pupa, and adult. The leaf miner becomes a pupa in the burrow, which can be observed with the naked eye and the adult emerges through the leaves. The lifespan of adult insects is about 10 to 30 days in the temperature range of 15~25℃, and it survives about 1 month at about 20℃. It spawns about 200-300 eggs. Just one of these beneficial insects can kill 70 leaf miners a day.

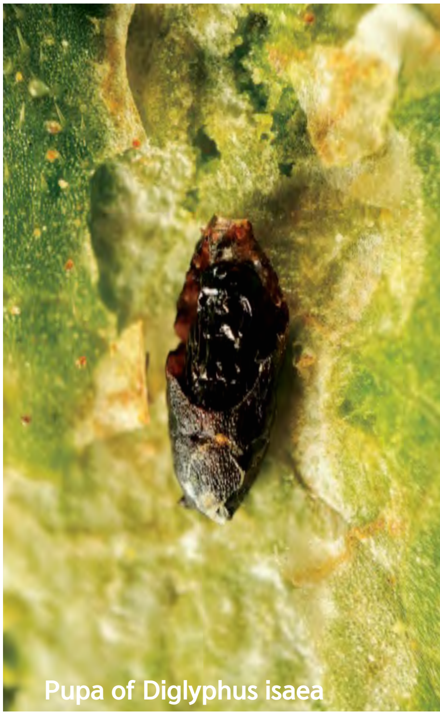
(Guide of utilizing natural enemies, Yongheon Kim)

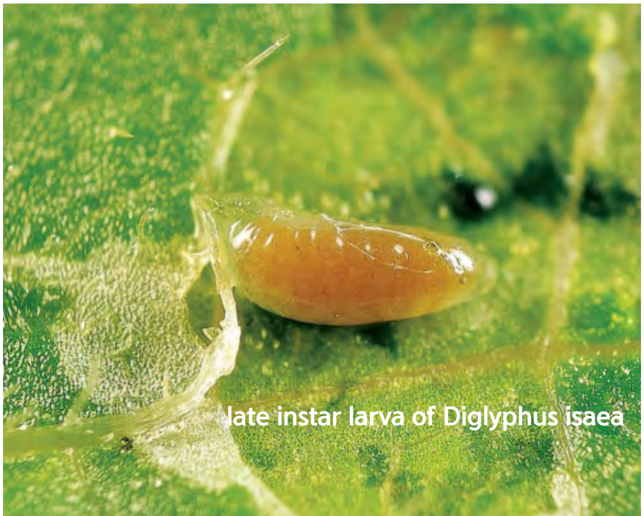

Adult Diglyphus isaea

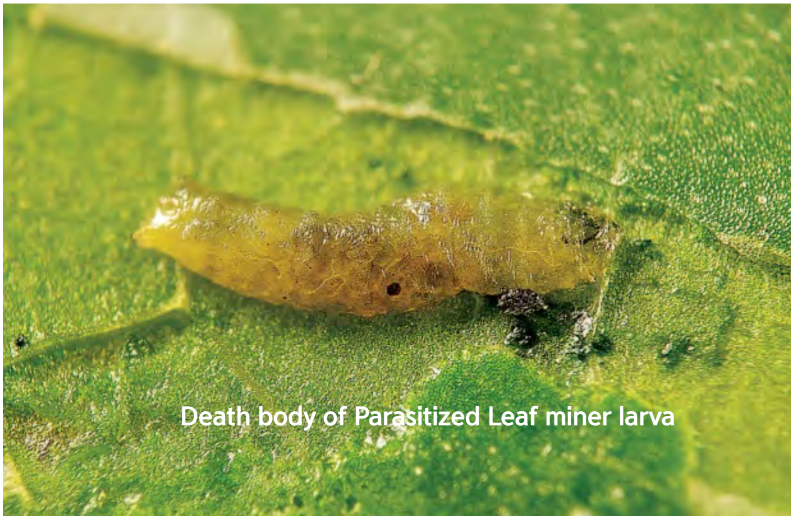

Pupa of Diglyphus isaea


Female adult


Diglyphus isaea spawning (red arrow)


Pupa of Diglyphus isaea


late instar larva of Diglyphus isaea


Death body of Parasitized Leaf miner larva

Velinus nodipes

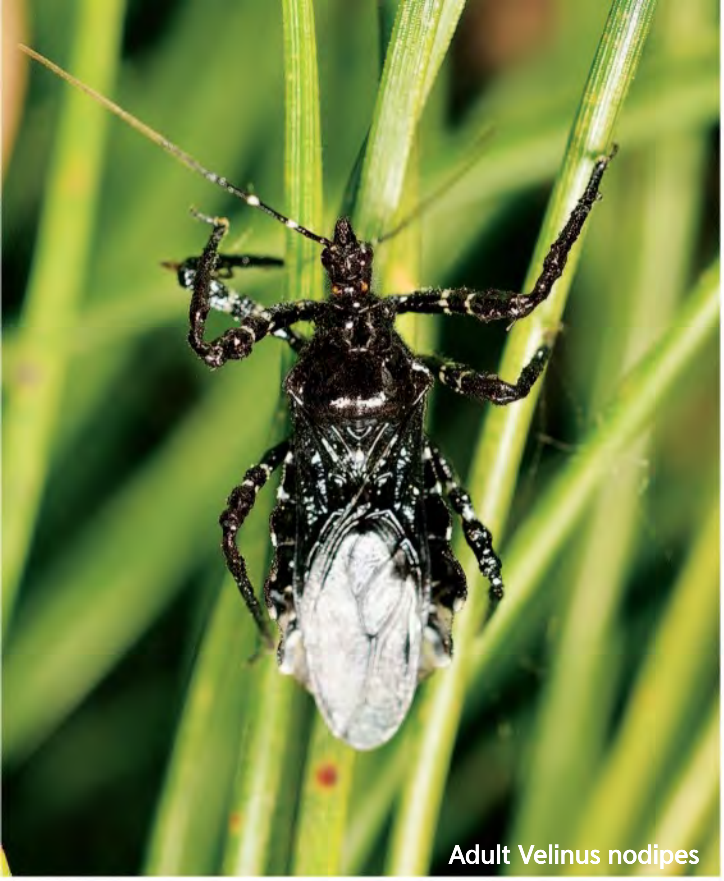
Description

Body length is 12~15mm. The body is black and is covered with resin-like substances in many cases and has a dull luster. The head's upper end is thin, the neck is narrow, and the antennae are thin and long black 4 segment. The pronotum is constricted in the center, and there is a cross-shaped yaw line in the center, and the front half forms two ridges on the left and right. The scutum (shield plate) is small, and the upper end is small-grained and yellowish-white. The hemielytorn protrudes beyond the ventral plate long and has a brown color. The joining plate is flaky and erect on both sides, and each node's circumference is wavy. Legs are black, thigh joints are raised with 3 nodules, and the area between the ridges is yellowish-white.

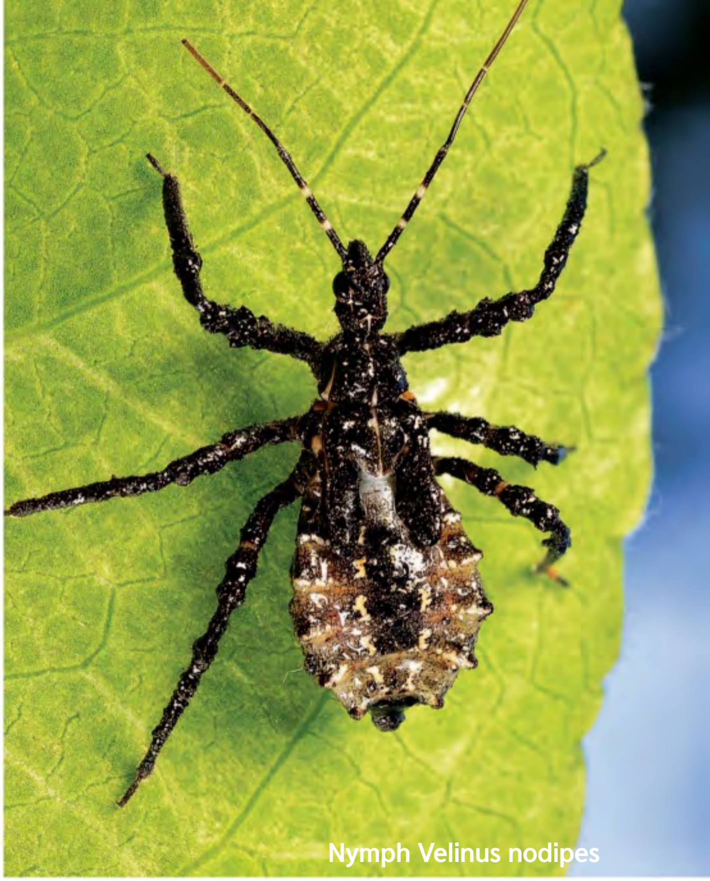
Life cycle

From the end of October to the beginning of November, the larvae grow in groups in trees and overwinter between cracks.

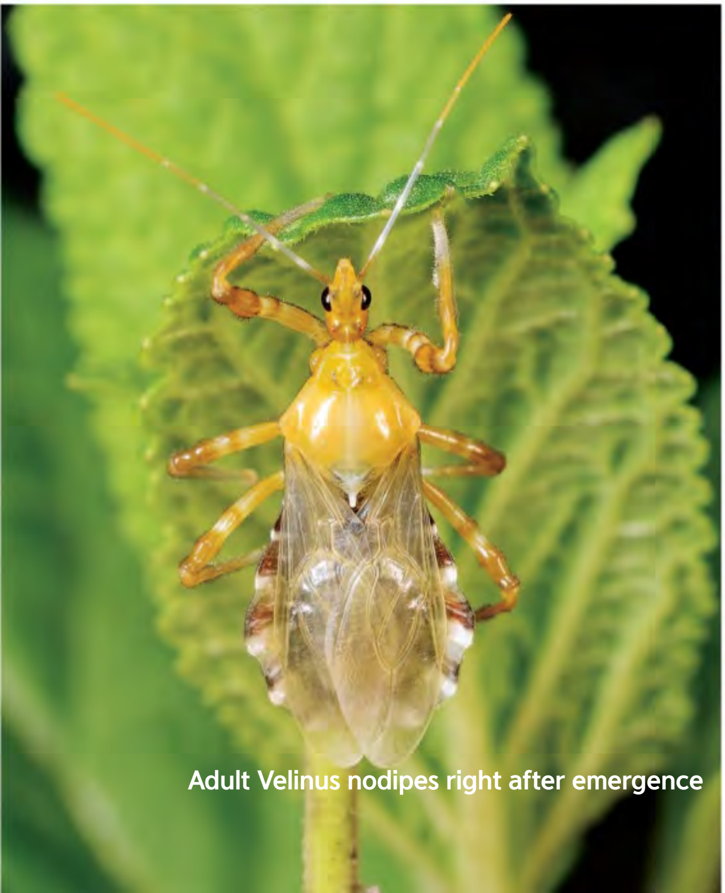
(KOREA FOREST SERVICE)



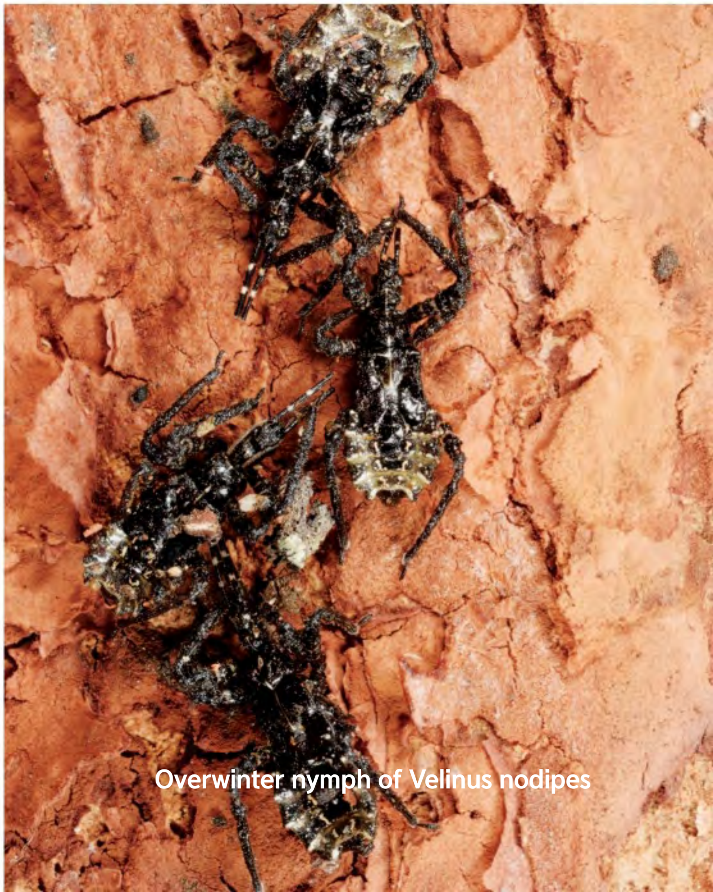
Adult Velinus nodipes



Nymph Velinus nodipes



Adult Velinus nodipes right after emergence



Overwinter nymph of Velinus nodipes

Spider mite destroyer

Stethorus punctillum

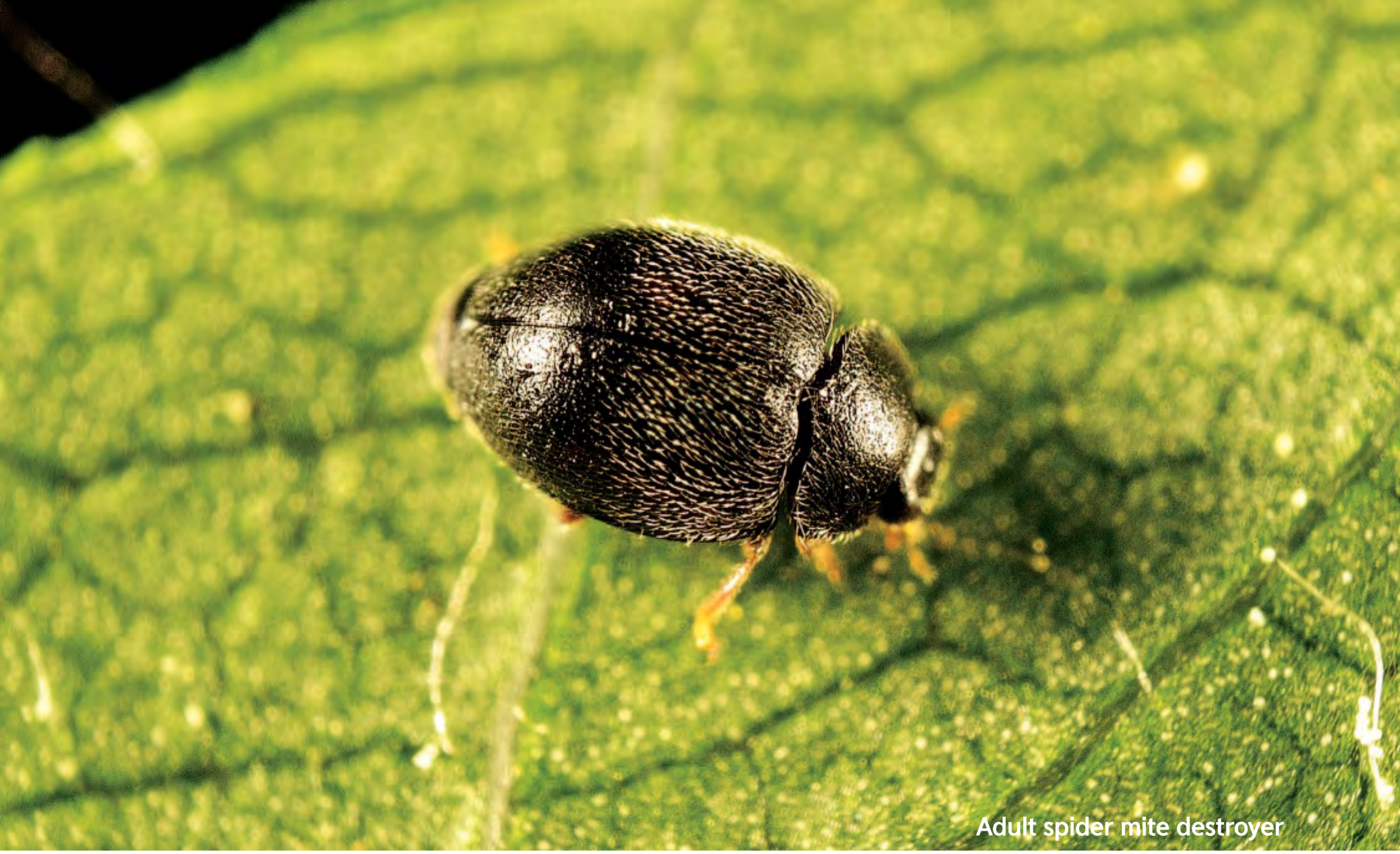
Description

The spider mite destroyer belongs to the Ladybug family and is about 1.5mm in size. It is not a very well-known indigenous species of Korea. The spider mite destroyer is often used in greenhouses where mite damage is severe. Its optimum temperature for utilization is from 16~35 ℃.

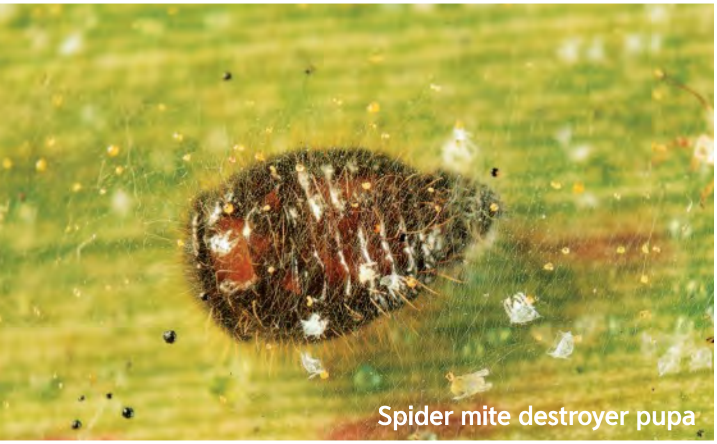
Life cycle

Like a ladybug, it goes through egg, larva, pupa, and adult stages and takes about 14-20 days from egg to adult (21~26℃). Each day, female adult insects prey on 20 to 40 mites, and they eat 50 eggs each. In the absence of food, they may eat moth eggs. The female lays 3 to 13 eggs per day and lays more than 1,000 eggs during the lifetime (about 2 years).

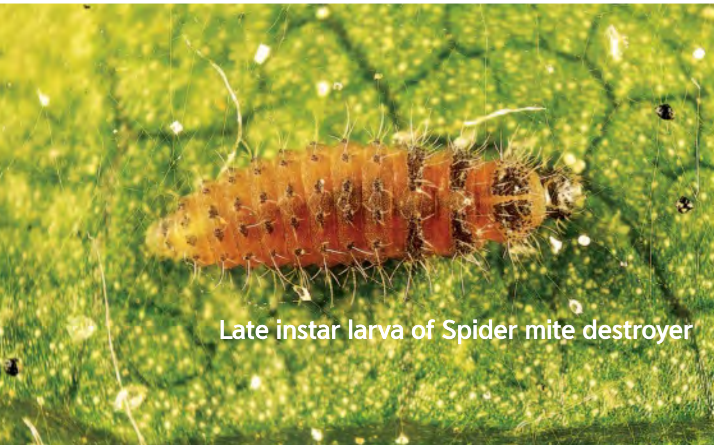
(Guide of utilizing natural enemies, Yongheon Kim)



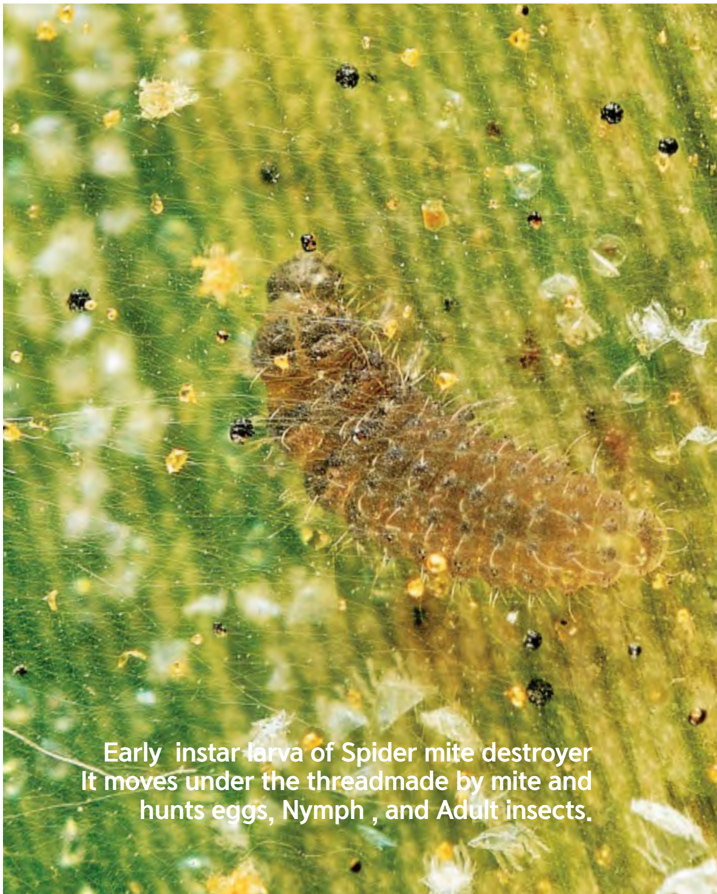
Adult spider mite destroyer



Spider mite destroyer pupa



Late instar larva of Spider mite destroyer



Early instar larva of Spider mite destroyer
It moves under the threadmade by mite and
hunts eggs, Nymph , and Adult insects.

Aphelinus varipes

Description

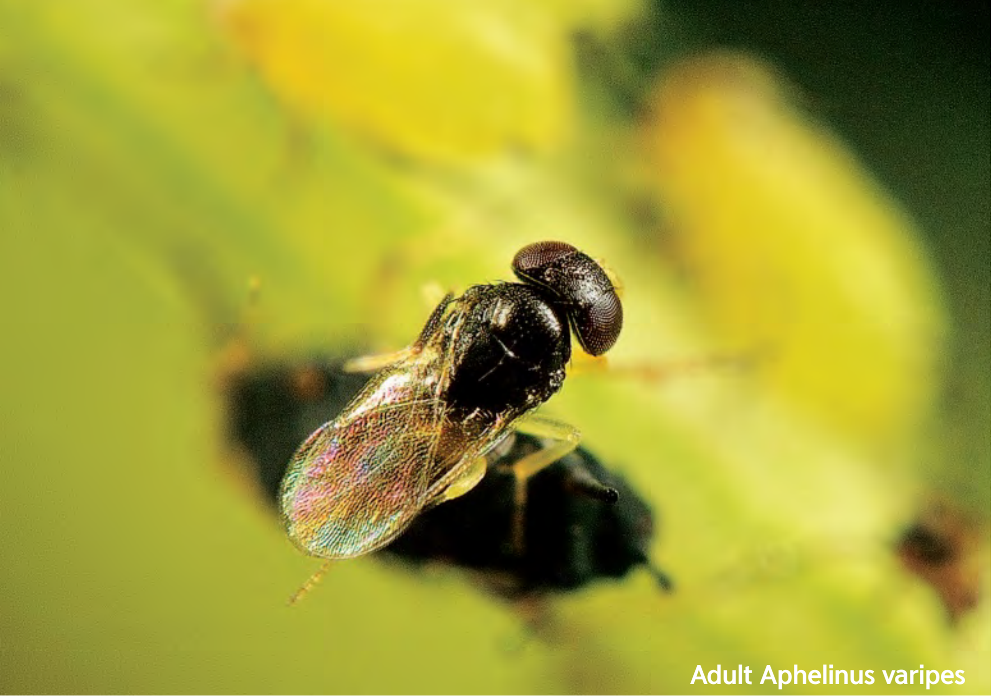
Aphelinus varipes is a predatory parasite that attacks aphids along with Aphelinus asychis. The body size is about 1.1mm, and the female is larger than the male. The developmental period is 18.3 days at 20℃, 14.7 days at 25℃, 10.4 days at 30℃, 9.3 days at 35℃. The pupa mortality rate at 35℃ is 10.4%, so it has excellent adaptability to high temperatures, so it is used as a natural enemy of aphids in summer.

The predatory parasitic rate is 15-23% it can attack the first to third instar aphid in the at a temperature of 25℃, the higher the temperature, the higher the ratio of females increases (30℃, 69%), which can effectively suppress aphids when used during high temperature.

Life cycle

The higher the temperature, the higher the pupa mortality rate, which is 10.2% at 35°C. The pupa mortality rate from 20℃ to 30℃ is as low as 0~2.8%.

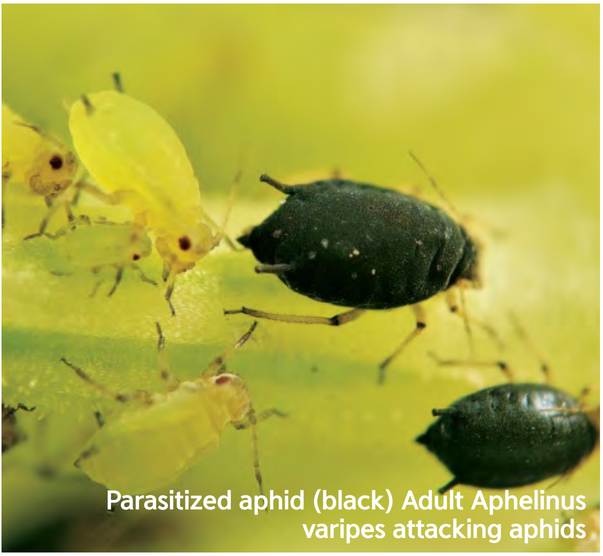
(National Crop Pest Management System/NCPMS)



Adult Aphelinus varipes

Attacking aphids

Attacking aphids



Parasitized aphid (black) Adult Aphelinus varipes attacking aphids

Adult Aphelinus varipes attacking aphids

Attacking aphids

Attacking aphids

Adult Aphelinus varipes attacking aphids

Insidious flower bug

Orius laevigatus

Description

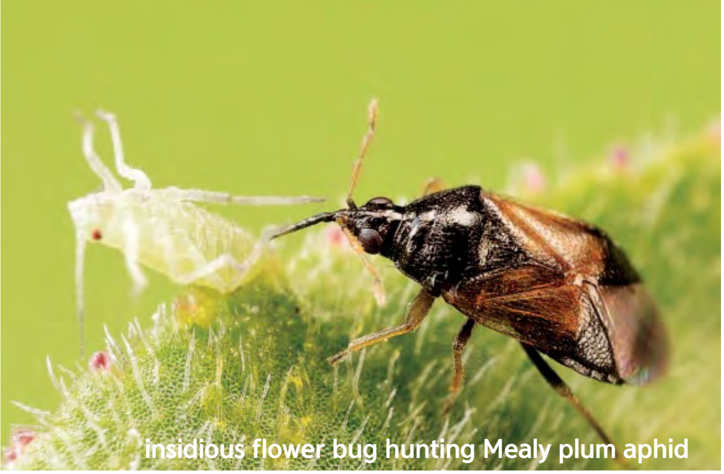
The color of the adult insidious flower bug in the early days of moulting is yellow-white and soon after it turns to a glossy or dark brown with red eyes. The body length of a female is 2.1 mm and a male is 1.7 mm. The female is bigger than male. The size of an egg is around 0.5 mm ~ 0.6 mm and 0.1 mm in diameter. The insect spawns within the tissues of the plant's vein or stem.

The egg is white circle-shaped and the center of an egg looks like 凹. Only a part of an egg is exposed and the bottom part is in the plant tissue. The size of an insidious flower bug nymph is different depending on the instars and it is about 0.6 mm to 2.1 mm. The size of an insidious flower bug nymph is different depending on the instars and it is about 0.6 mm to 2.1 mm. The body color of the first-instar and the second-instar is orange and their body is configured into the head, chest, and abdomen. The edge of its abdomen is thinner. There is a red dot on the back of the third, fourth and fifth instars. In the third instar, its color changes to yellow and the color of the dot becomes darker. From the fourth instar, its color changes to yellow-brown and it begins to form wings. The fifth instar or later instar, changes to dark brown and it turns into an adult with wings.

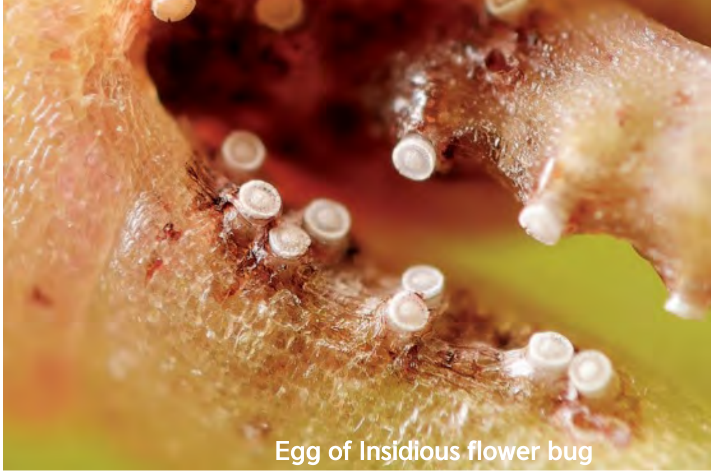
Life cycle

Insidious flower bugs not only eat thrips but also young aphids, mites, newly hatched moth's larvae, eggs, pollen and more. Because the habitat of major species such as Western flower thrips, and flower thrips is the same as insidious flower bugs, it is easy to use biological control. Therefore, it is widely used throughout the world.

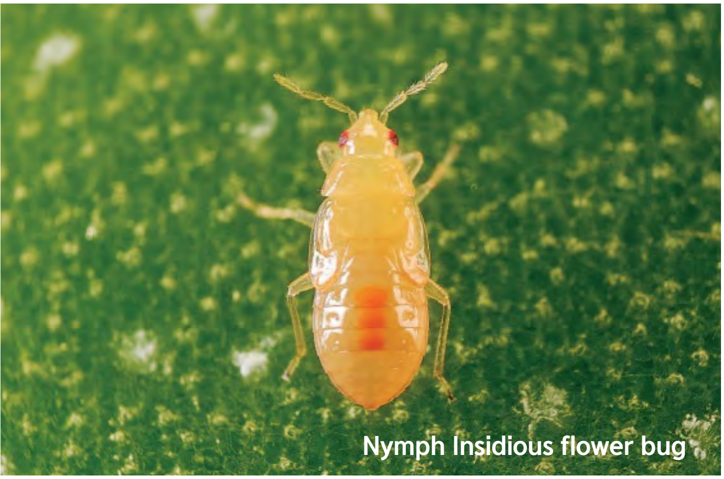
(National Crop Pest Management System/NCPMS)



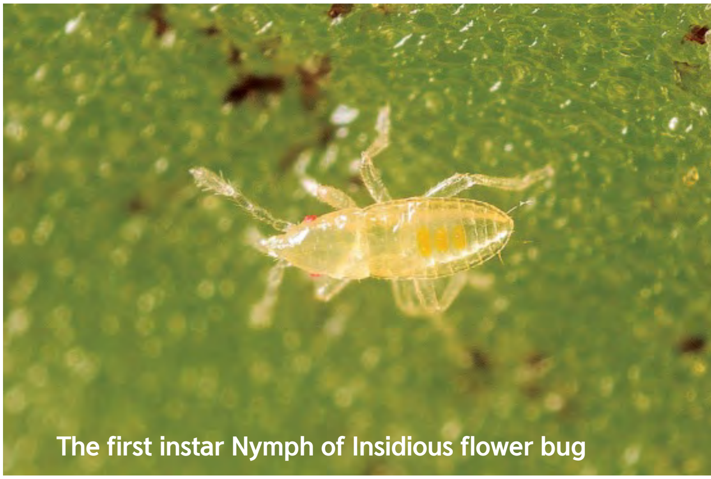
insidious flower bug hunting Mealy plum aphid



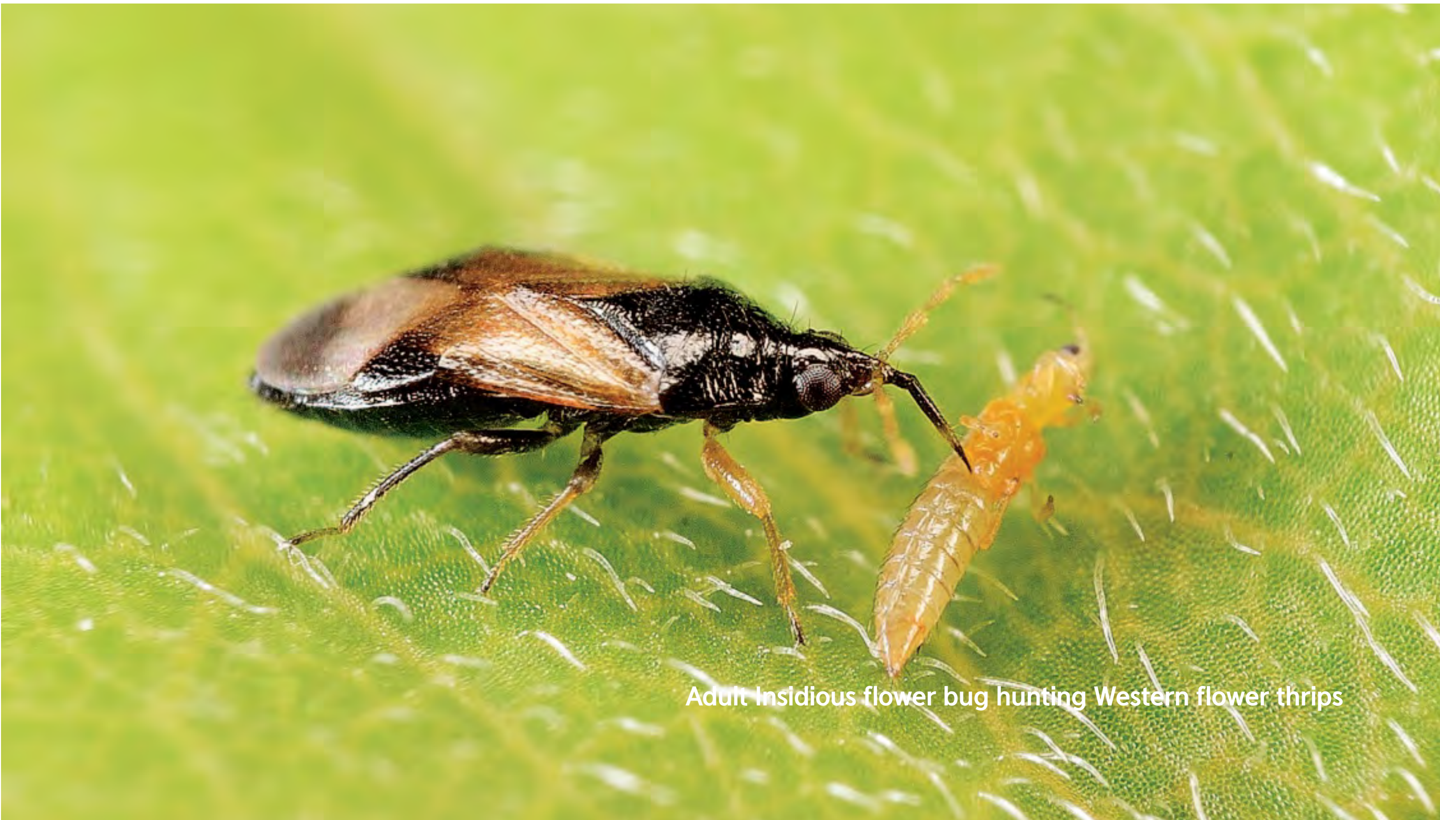
Egg of Insidious flower bug



Nymph Insidious flower bug



The first instar Nymph of Insidious flower bug



Adult Insidious flower bug hunting Western flower thrips

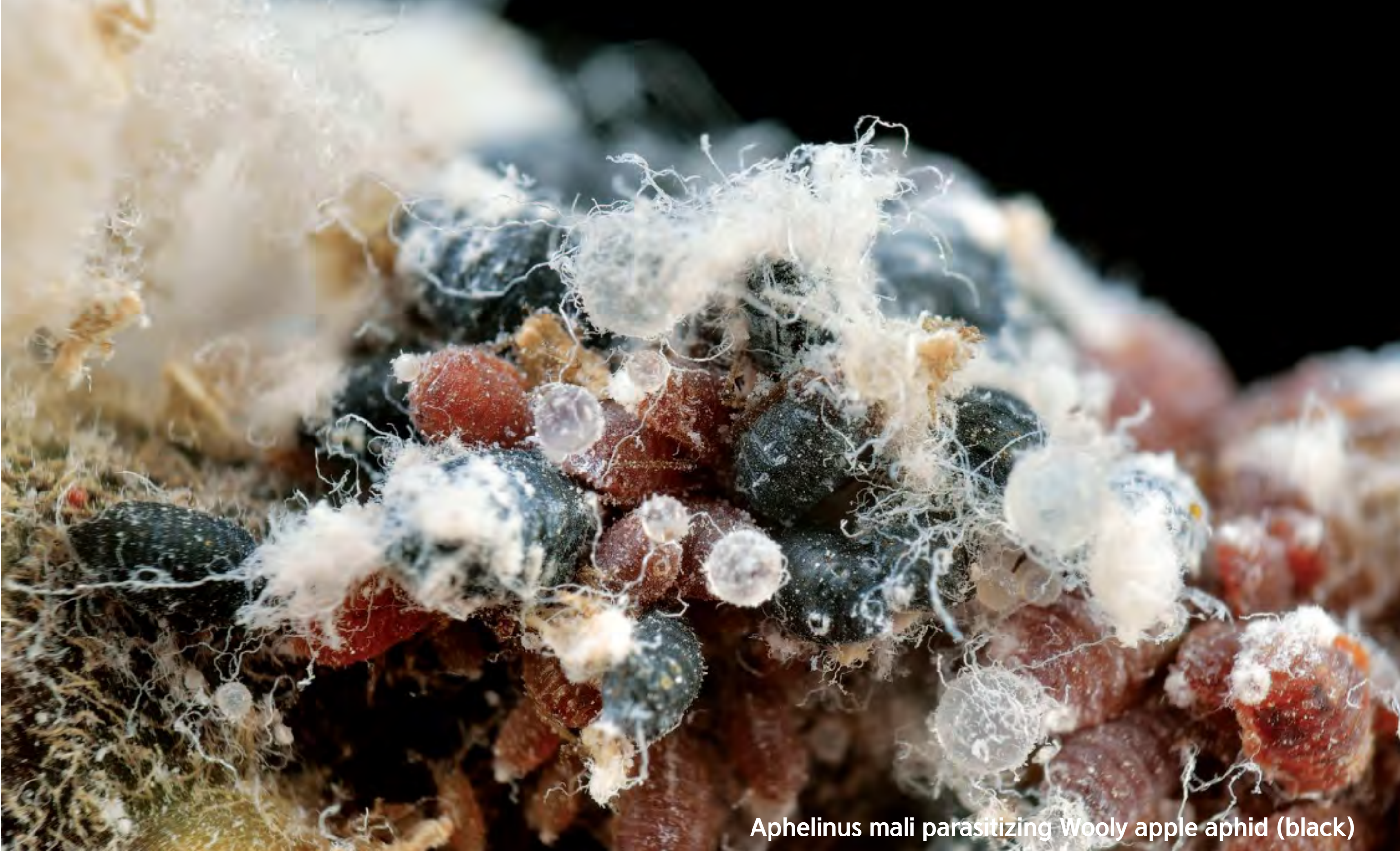
Aphelinus mali

Description

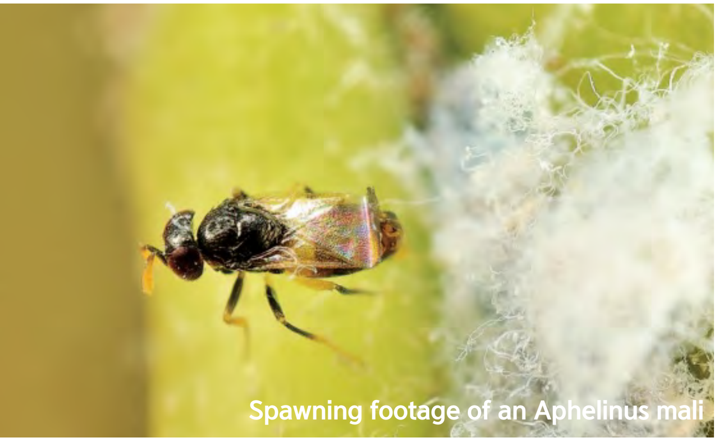
Eggs are 0.07~0.21mm, larvae hatch inside the body of aphids and are elongated or shield-shaped. Their body color is bright yellow, and the eyes are red. The pupa is generally smaller than the larva, including the thorax, the legs, and other appendages. The pupa also lives inside the body of the aphid. The adult has a short antenna and its body color is black. Membranous wings are folded flat on its back, and the ends are spread out. They prefer jumping and hiding under leaves rather than flying.

Life cycle

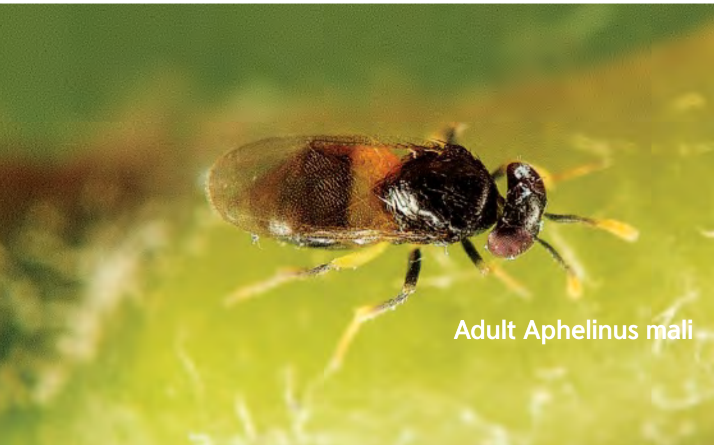
It can have 6~7 generations a year, and the time of appearance of adult larva coincides with the time of occurrence of Aphelinus mali in spring. Female adult worms lay eggs on the lower surface of the abdomen of Aphelinus mali. There are no external symptoms of parasitism in the early stages of growth, and the host can grow and spawn even in an infected state. The eggs hatch in about 3 days, and the larva's growth takes about 10 to 12 days. The life cycle is 20-25 days. (Deogkee Park)



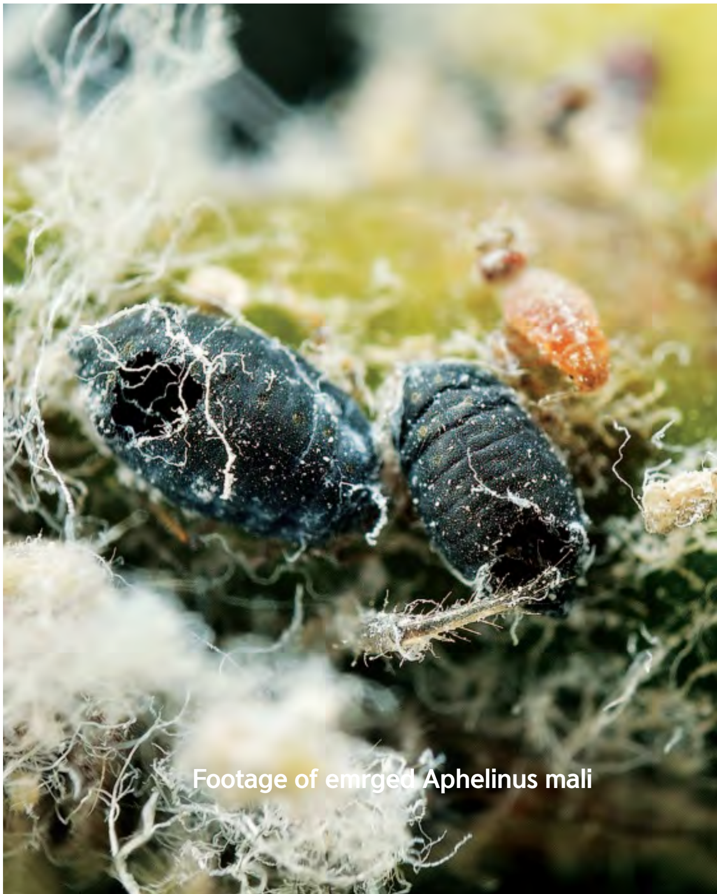
Aphelinus mali parasitizing Wooly apple aphid (black)



Spawning footage of an Aphelinus mali



Adult Aphelinus mali



Footage of emrged Aphelinus mali

Amblyseius californicus

Description

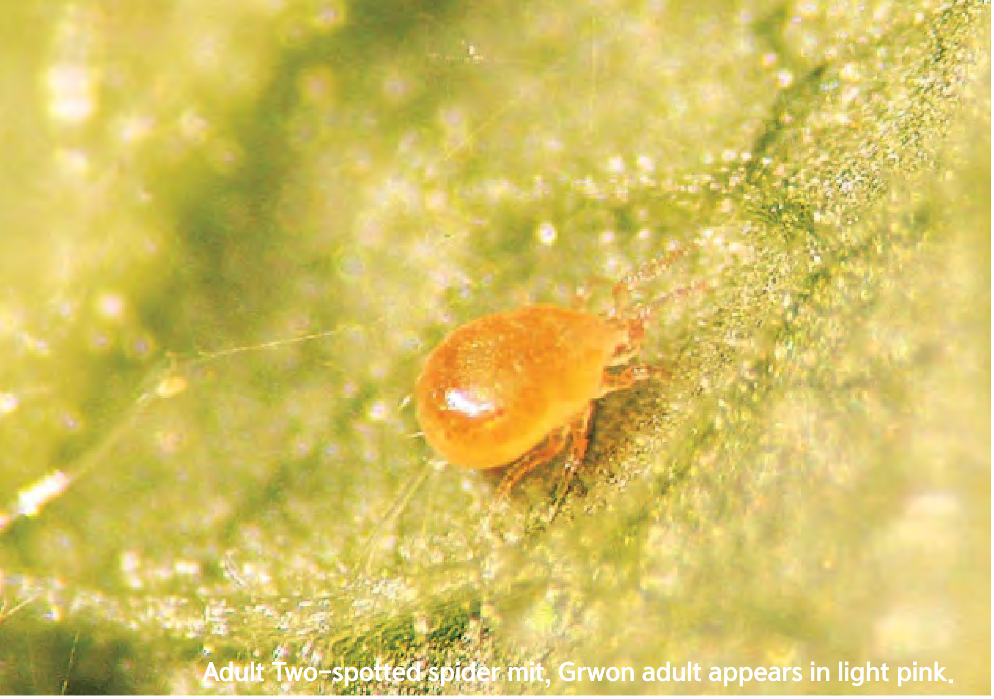
The predatory mite is a native species to the United States and frequently occurs in strawberry fields in California and Florida. Their movement is very active, and it is a natural enemy with excellent effects in high temperatures (30℃) and dry environments. It can be the most potent natural enemy in controlling leaf mites during the summer in a greenhouse. Unlike Phytoseiulus persimilis, it can also grow in pollen so that it can be used in advance for prevention during the absence of leaf mites. Their size is 0.34mm, the adult is light yellow, and the end of the abdomen is blunt. They rarely have short setae on the back.

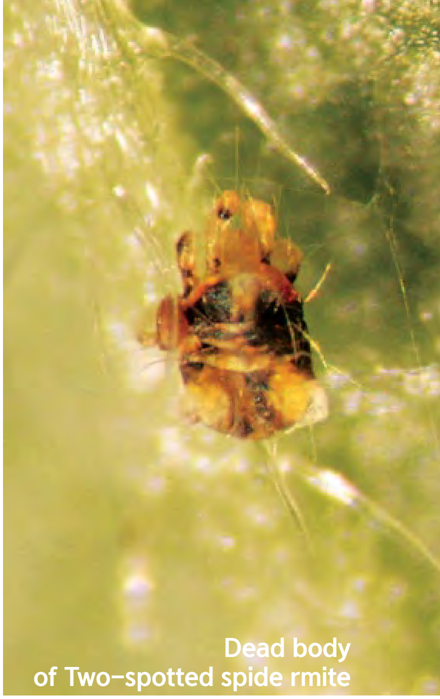
Life cycle

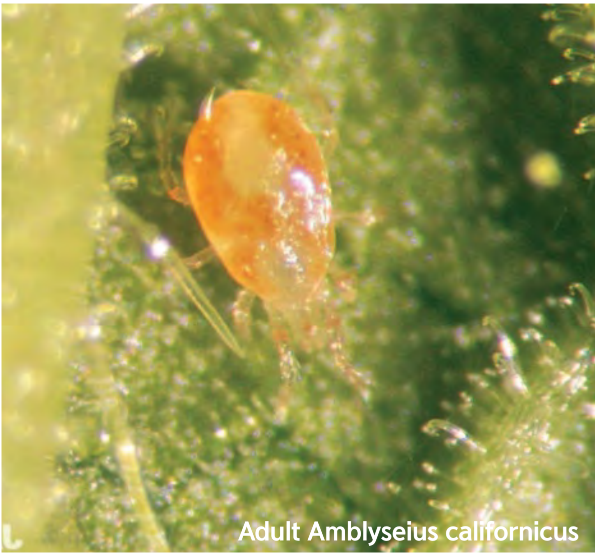
Like the Twospotted spider mite (Tetranychus urticae), it has the developmental stages of eggs, larvae, first instar, second instar larva, and adults. It becomes an adult within 4 days under high-temperature conditions. At the same temperature, the growth rate is twice as fast as that of leaf mites. The adult Amblyseius californicus survives about 20 days, and the female lays 3 eggs on average each day for 14 days.

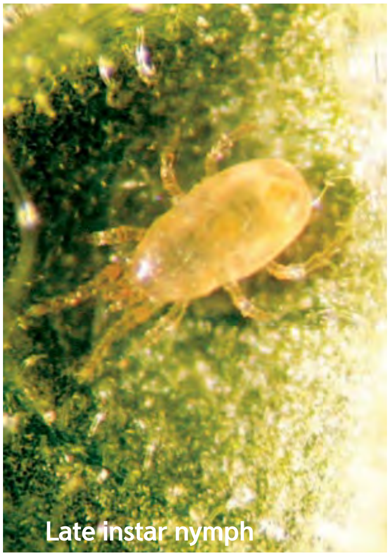
This particular predatory mite can eat all development stages of Two-spotted mites and European apple mites. However, it prefers early development stages. It is mainly found on the back of the leaf and eats 5 adult leaf mites a day. Unlike Phytoseiulus persimilis, it has the ability to survive for a long time without eating and can live on pollen, it does not eat among the same species.

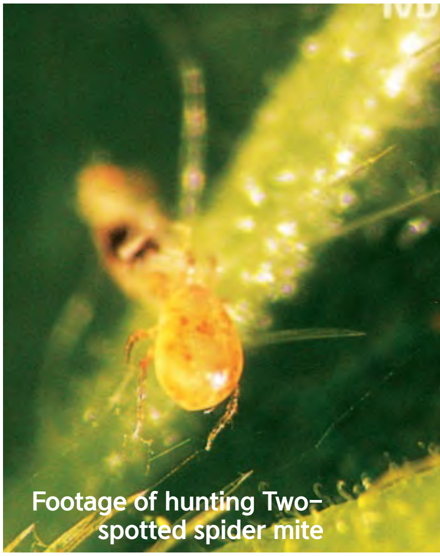
(Guide of utilizing natural enemies, Yongheon Kim)

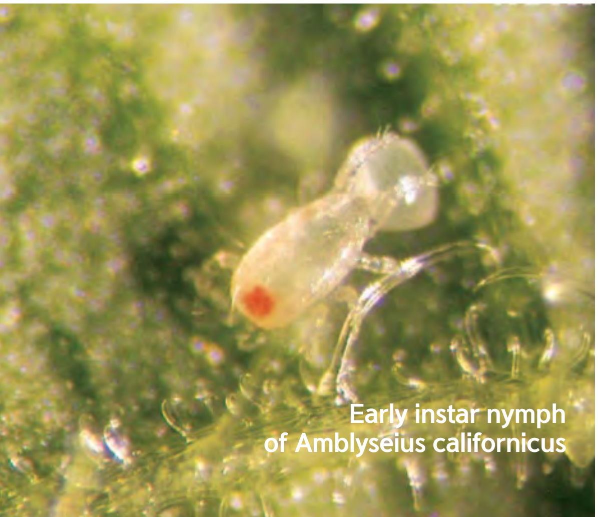

Adult Two-spotted spider mit, Grwon adult appears in light pink.

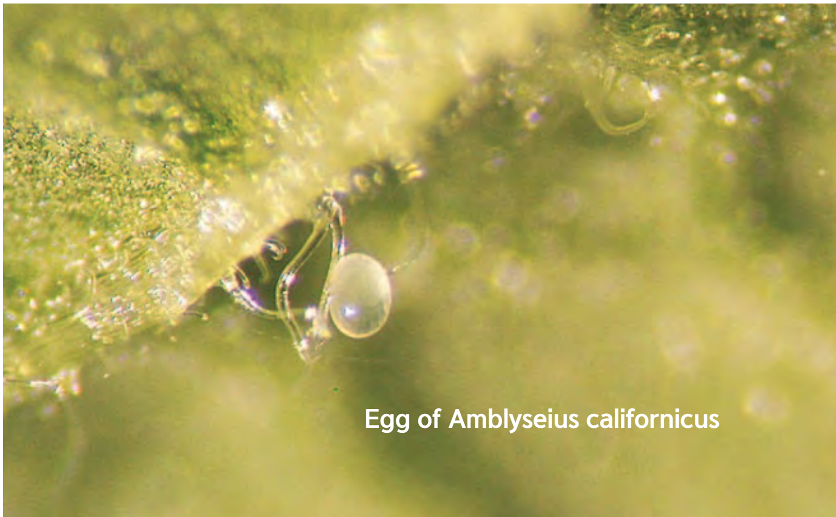

Dead body
of Two-spotted spide rmite


Adult Amblyseius californicus


Late instar nymph


Footage of hunting Two-spotted spider mite


Early instar nymph
of Amblyseius californicus


Egg of Amblyseius californicus

Aphidius gifuensis

Description

An adult insect's body length is a little thin, about 3-4㎜, and the body color has many black and brown lines. The wings' veins are not clear, the antennae are long, and there are 4 comb wrinkles on the first joint of the abdomen. All developments occur in the body of the aphid. The first instar has a distinct body part and the snout is not clear except in adults, but at the end of the fourth instar, all the contents of aphid's body become empty, only a shell remains, and the aphid becomes mummified.

Life cycle

When it becomes an adult, it travels through the epidermis of aphids and comes out. Males come out first, and as soon as the females come out, mating takes place. The mated female spawns while searching for aphids and inserts the ovipositor (spawning tube) into the aphid body by bending the abdominal joint forward and downward.

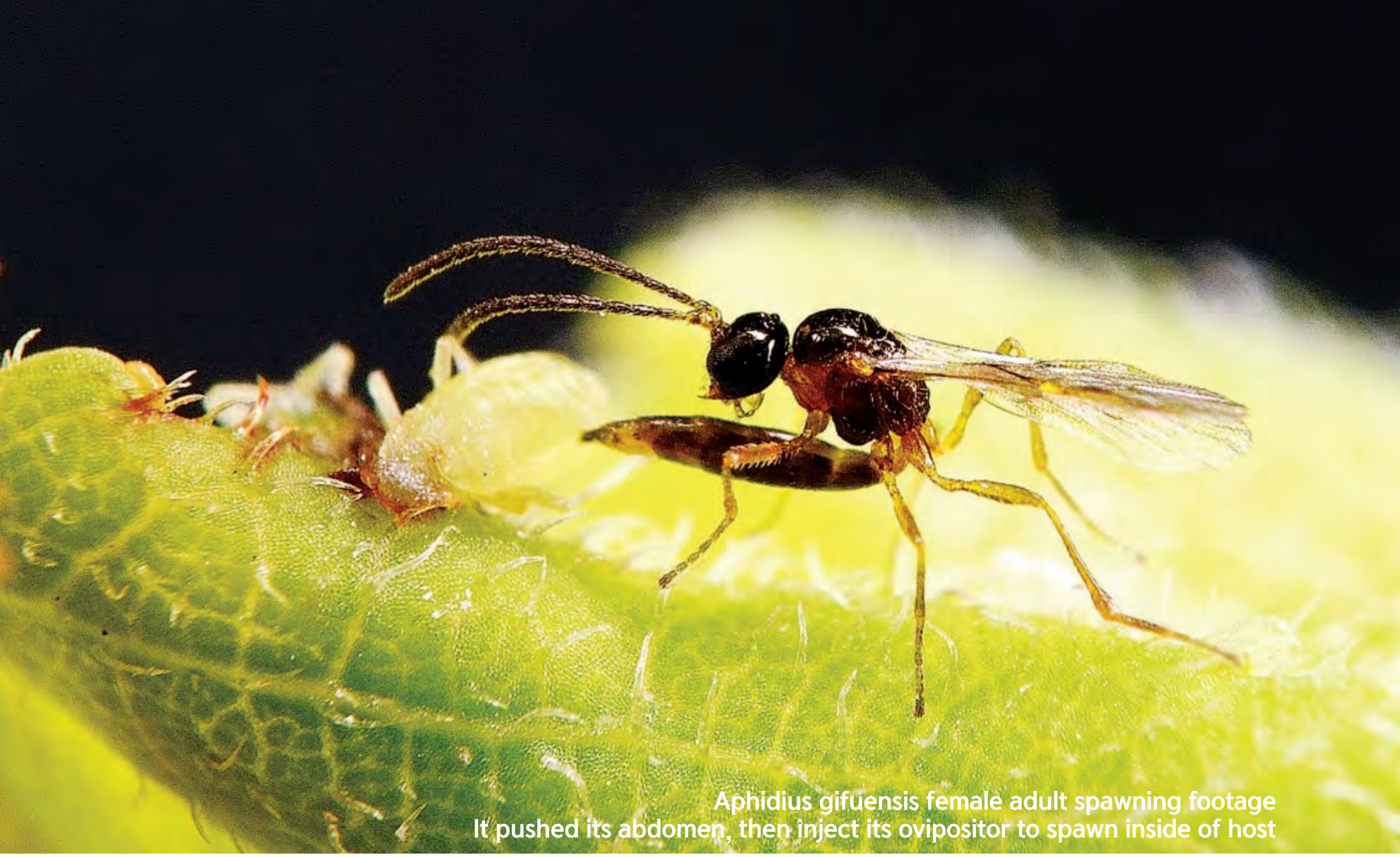
The spawning time is extremely short, usually around 1 second. This is a tiny aphid parasite that belongs to the Braconisomere family, and has the characteristic that breeding occurs only when parasitizing on aphids. Aphidius gifuensis is an indigenous parasitic natural enemy in the subtropic region.

Aphids are known to be parasitic to all major aphids of horticultural crops, such as peach aphid and cotton aphid, but the aphid with the highest parasitic rate is the peach aphid.

It goes through the life cycles of eggs, larvae, pupa, and adult, and the pupa period from egg to pupa grows in the body of aphids to form a mummy, and when it becomes an adult, it breaks through the mummy and becomes parasitic on other aphids again.

The development period is 7.8 days from eggs to larvae and 10.2 days between percent pupation. It takes about 18 days to complete the first generation, and the number of spawn is generally about 30-50 per female.

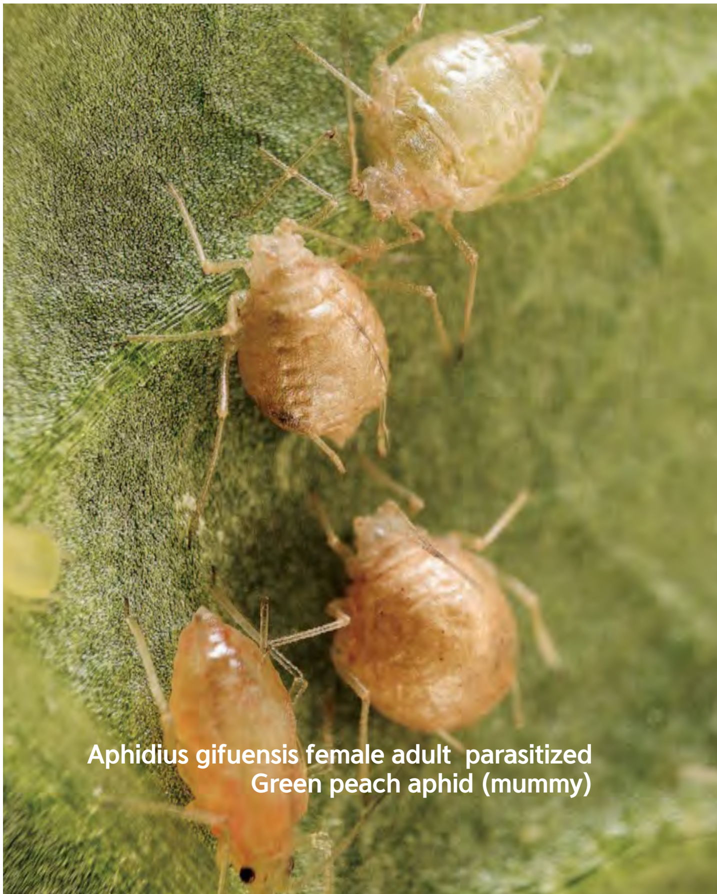
(National Crop Pest Management System/NCPMS)



Aphidius gifuensis female adult spawning footage
It pushed its abdomen, then inject its ovipositor to spawn inside of host

Female adult Aphidius gifuensis

Female adult Aphidius gifuensis



Aphidius gifuensis female adult parasitized
Green peach aphid (mummy)

Thirteenspotted lady beetle

Hippodamia tredecimpunc tata

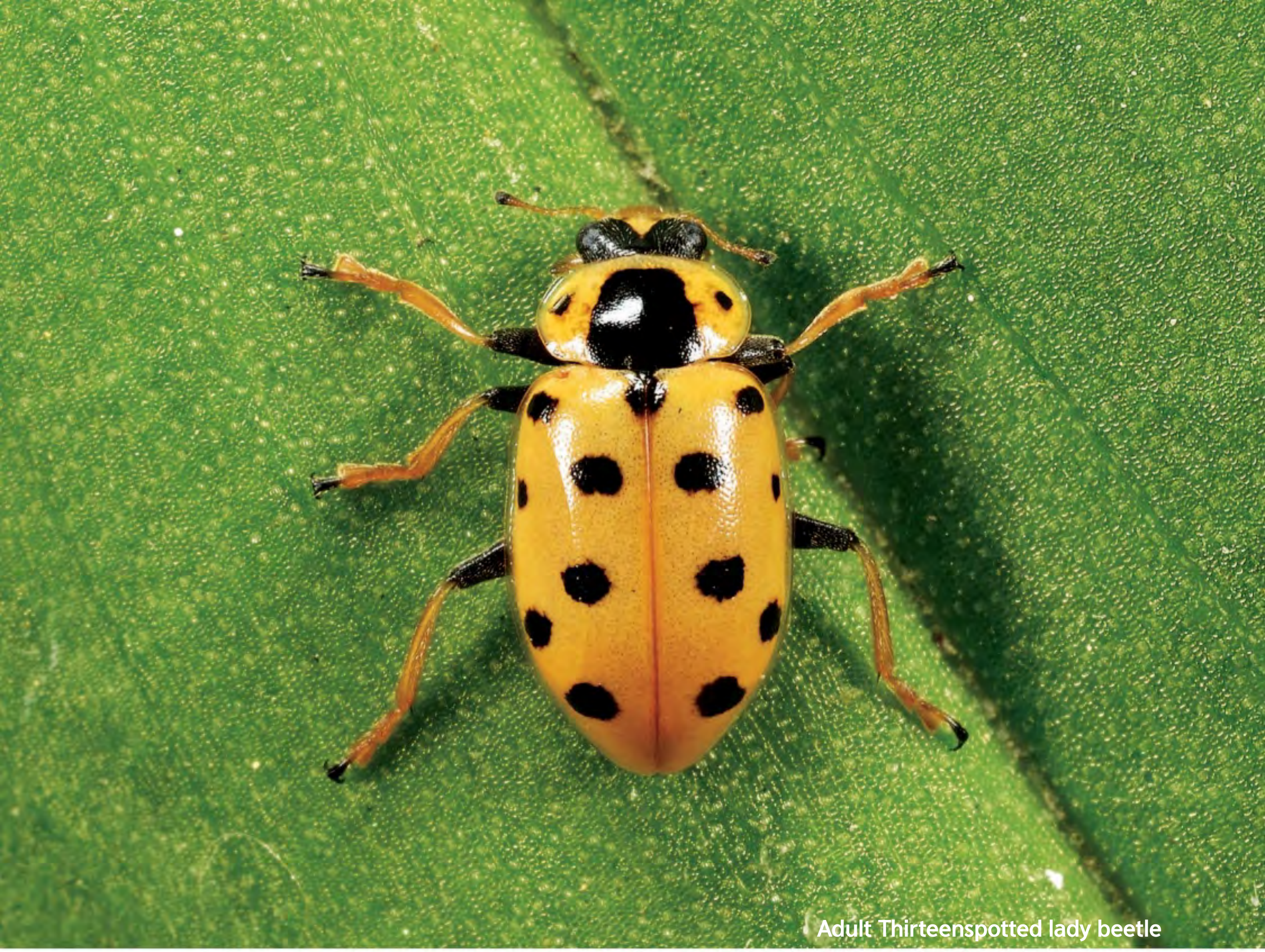
Description

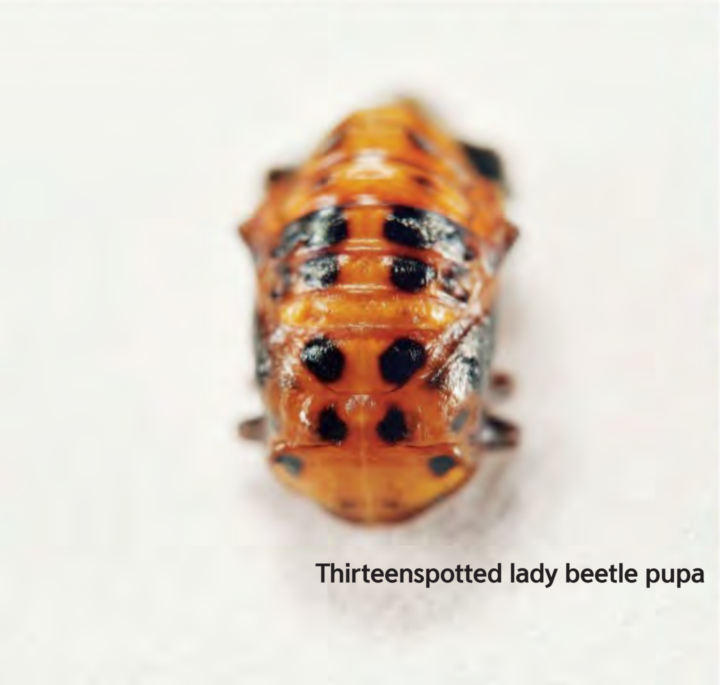
The body length is 6mm. The body of an adult larva is narrow and long. Both parts of the chest have a light yellow color, and the middle of the thorax is black and looks like large spots. Part of the wing of the hard outer wing (elytra) is yellowish-red and crimson-red.

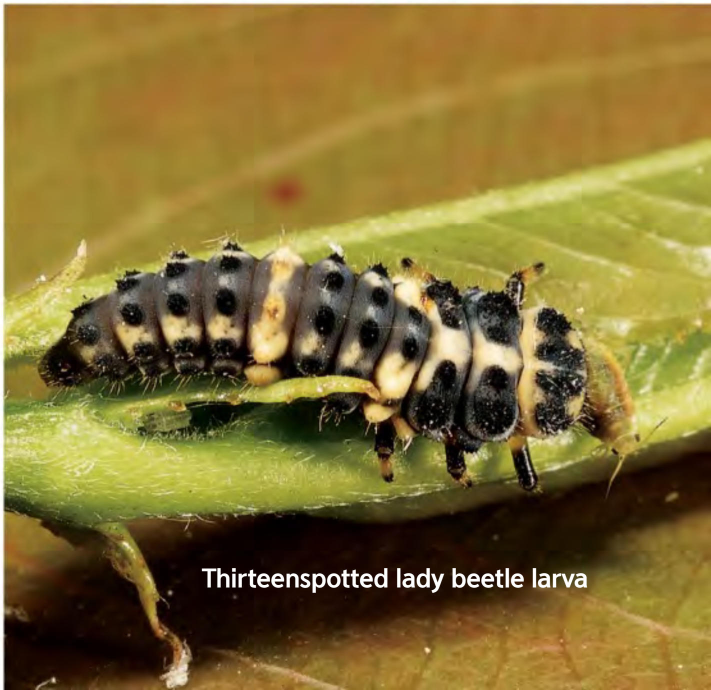
There are 13 black spots on the elytra, and both sides are symmetrical. They have longer legs than ordinary ladybugs, so the legs appear to be outside when viewed from above. The legs on the abdomen side are black, but the calves are yellowish-brown.

Life cycle

It transforms from Eggs, larvae, pupae, to an adult worms in its whole life span. Larva and adult insects mainly feed on aphids and live in places with grass, such as riversides or reeds in semi-wetlands. It spends winter as an adult.(Doosan Encyclopedia)


Adult Thirteenspotted lady beetle


Thirteenspotted lady beetle pupa


Thirteenspotted lady beetle larva

Redspotted black lady beetle

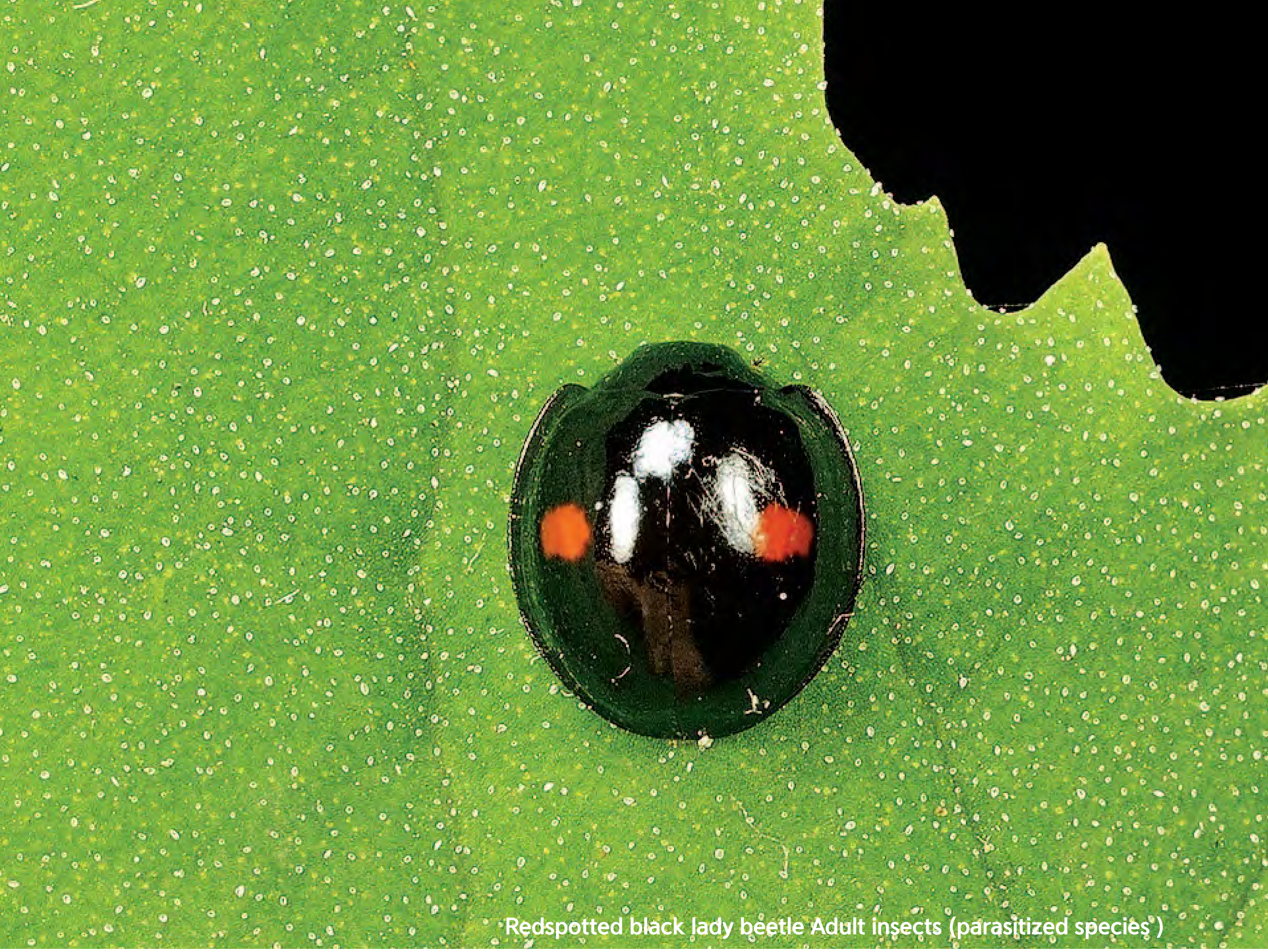
Chilocorus kuwanae

Description

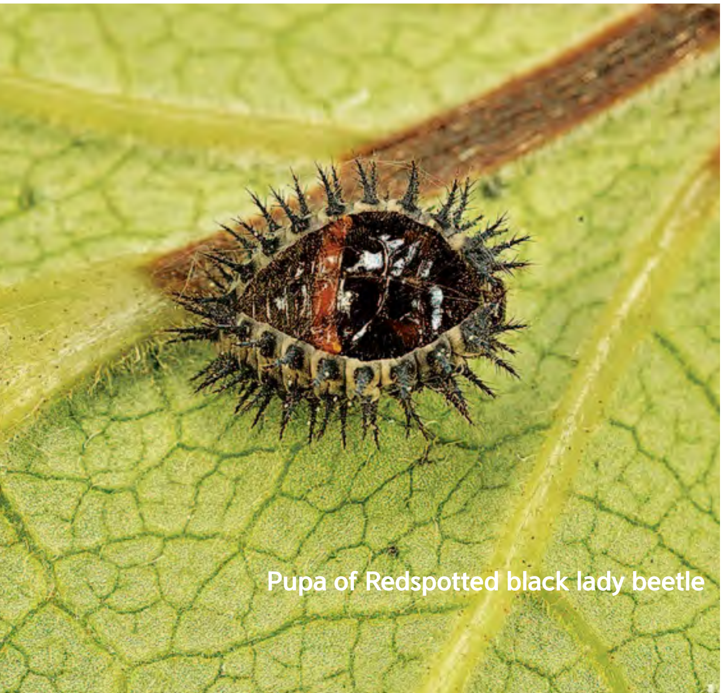
The body length of the red-spotted black lady beetle is around 3.6~4.3 mm. Most of its body is a circle and its back surface is convex. The color of its head is black and the shield of its brow is red-brown. The insect's pronotum, scutellum, and wing pad are black. There is a small red spot in front of the center of its wing pad. Most of the spots are long egg-shaped but sometimes, you can see horizontal spots. The width of the spots are 1/7~3/7 compared to the width of its wing pad. Each joint of its abdomen is red-brown and the center of the first joint and its legs are black.

Life cycle

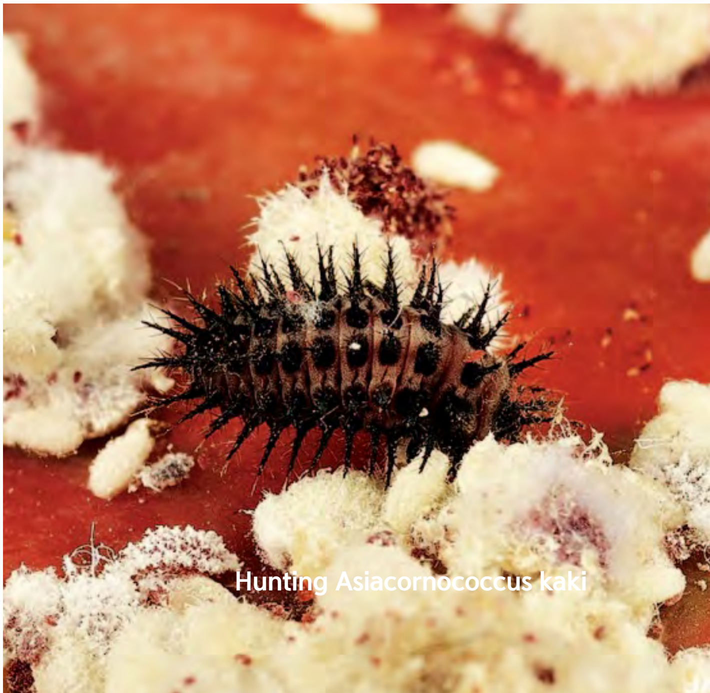
Red-spotted black lady beetle spawns from the early May and it appears 3 times a year. It lives on the bush and chaplain without distinction of a broadleaf tree or needle-leaf tree. The density of its population per year is high. Coccid control with red-spotted black lady beetle is very effective. The lady beetle eats various kind of coccid and lives in the forest, orchard, and garden. (Deogkee Park)



Redspotted black lady beetle Adult insects (parasitized species)



Pupa of Redspotted black lady beetle



Hunting Asiacornococcus kaki

Neoseiulus cucumeris

Description

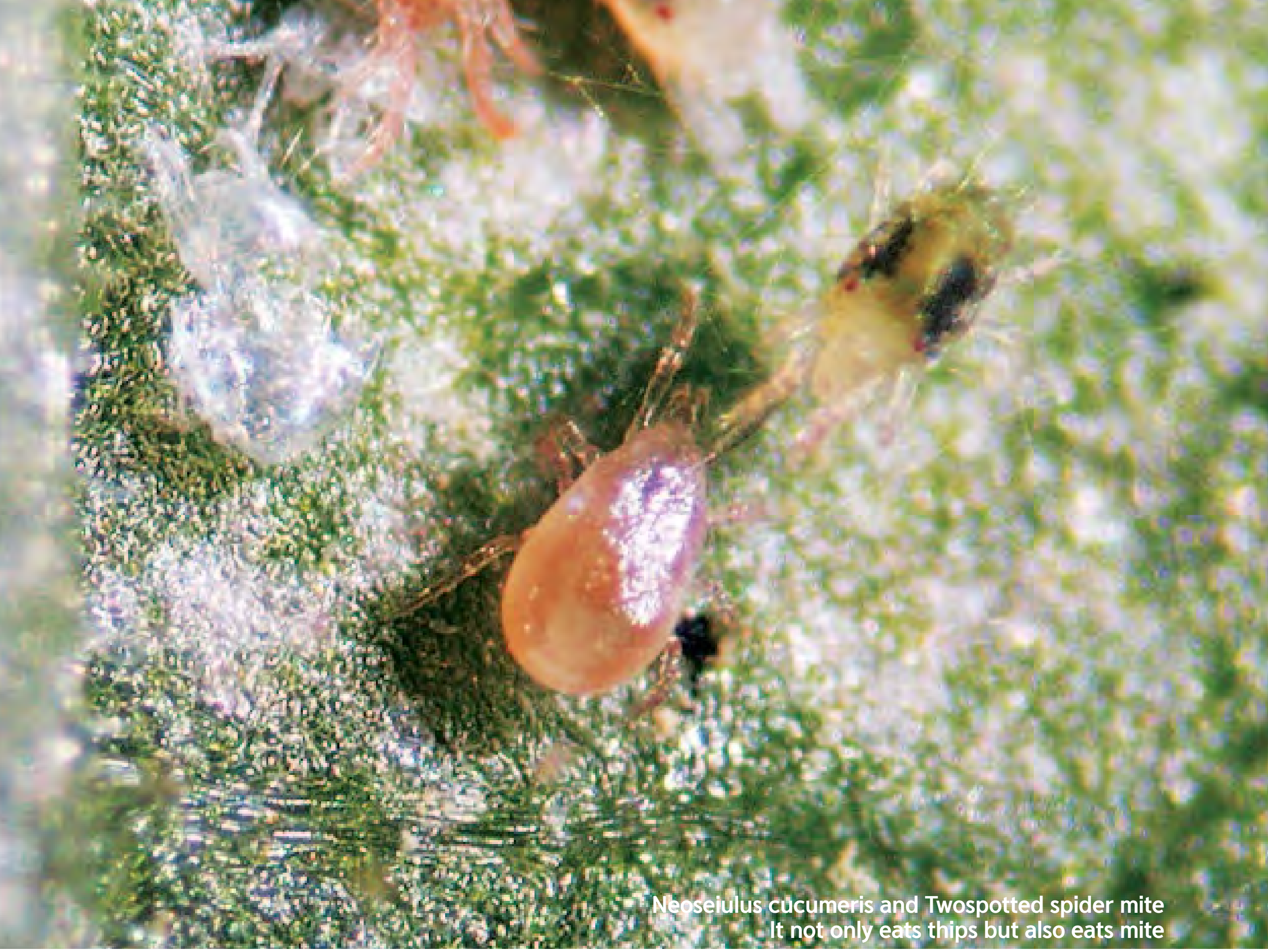
The body length is less than 0.4mm. Its primary host pests include Thrips palmi, western flower thrips, and flower thrips (Tripidae).

Life cycle

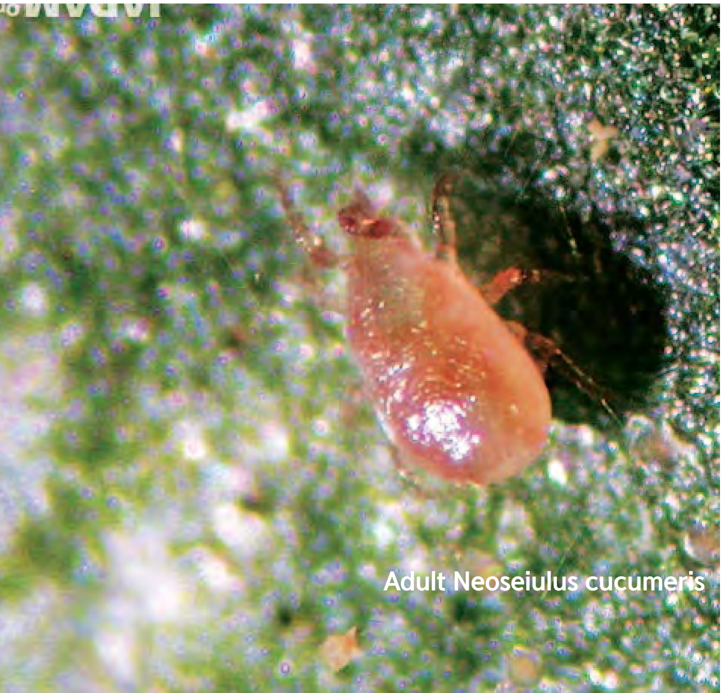
Predatory mite's stages of development are egg, larva, early-instar nymph, late-instar nymph, and adult. It spawns on the midrib, side vein, or behind a leaf. The stages of development from egg to adult, takes only 6 to 9 days at 25℃. The insect spawns around two eggs a day, birthing 40 to 50 eggs within 20 days. They eat 2 to 3 mulberry thrips a day. Generally, they eat young mulberry thrips larvae (first instar and second instar) and eggs.

Predatory mites can be used to control palm thrips or western flower thrips on cucumber, green pepper, eggplant, and flowers which are in a greenhouse. Before Thripidae appears or when the density of Thripidae is low, you can spread predatory mites or hang paper bags on crops with predatory mites.

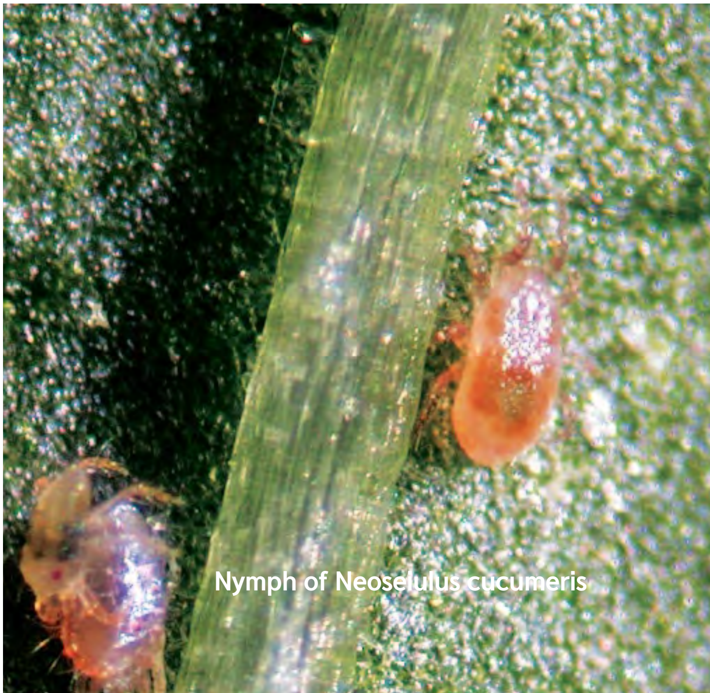
(Guide of utilizing natural enemies, Yongheon Kim)



Neoseiulus cucumeris and Twospotted spider mite
It not only eats thips but also eats mite



Adult Neoseiulus cucumeris



Nymph of Neoselulus cucumeris

Whitefly Parasite

Encarsia formosa

Description

The Whitefly parasite was first described based on specimens collected from the State of Iowa in the United States. Their origin was considered to be subtropical or tropical based on the biological properties of this insect, but it has not been confirmed.

The female adult body length is 0.6mm, the male adult insect is about 0.45mm, the head is dark brown, the thorax is black, but the sides are yellow, the abdomen is yellow, and the legs are brown. On the other hand, males are slightly larger than females, and their abdomens are black. It produces offspring by parthenogenesis, so males are not involved in reproduction. The ratio of males is generally low (less than 1-2%), but the ratio of males increases as the density ratio of insects increases. This occurs because female adults that exist in the body of the host (greenhouse whitefly larvae) become an adult male after parasitic activities with its host.

Life cycle

The whitefly parasite goes through the development stages of eggs, first, second, third pupa, and adult. These six developmental stages except for adult insects live in the host's body, and they parasitize inside of the host's body in the form of both nymphs or pupae.

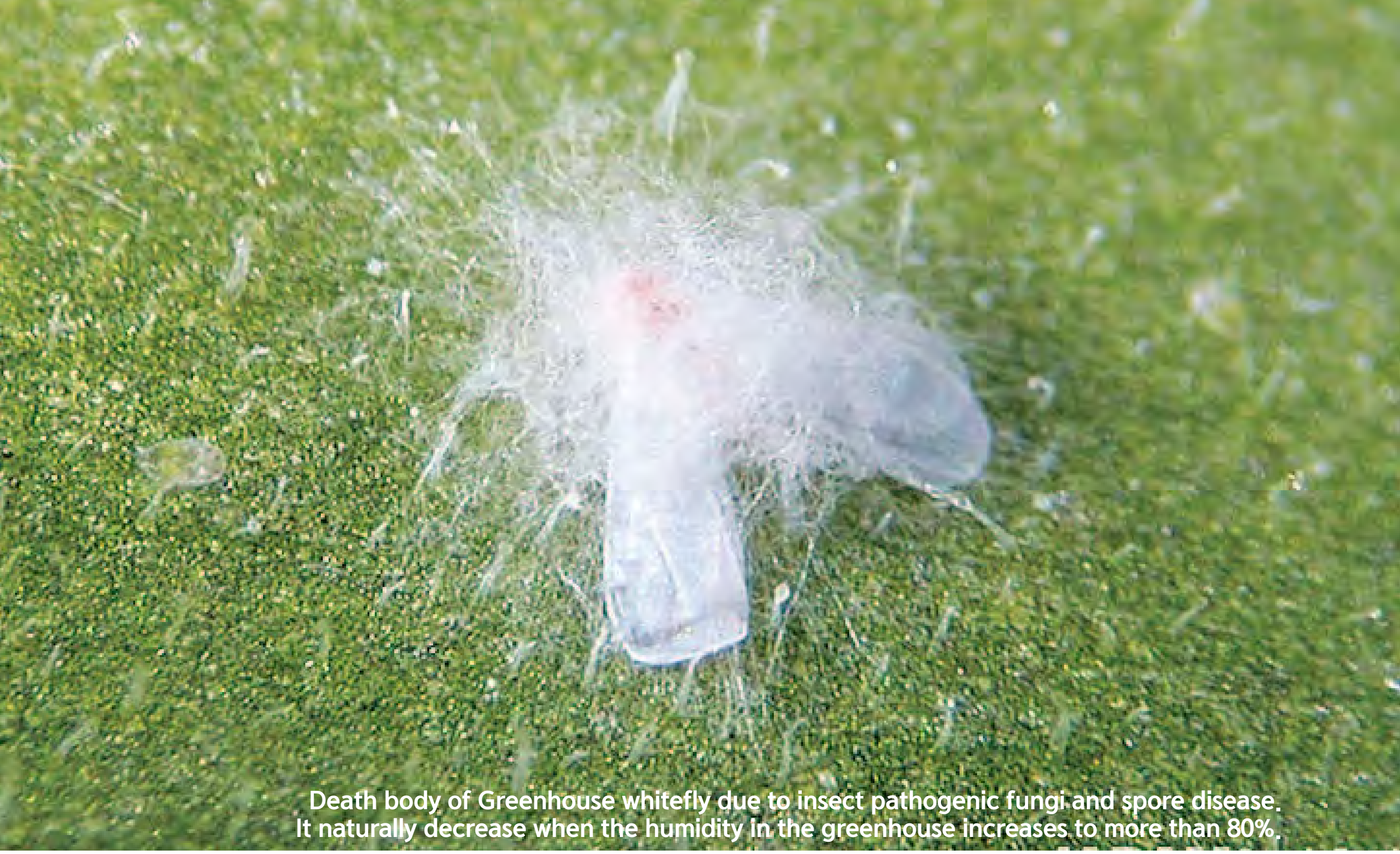
A female adult can spawn on all nymphs but especially prefer to spawn on the third and fourth instar greenhouse whitefly because they have the highest probability of success in development. The parasitized greenhouse whitefly pupa turns black when the whitefly parasite attacks the pest, so it is easy to determine whether or not it is parasitic.

Depending on the temperature, the development period is 40 days at 18℃, 30 days at 20℃, and 20 days at 30℃. its life span is approximately 1 month and it spawns 10 eggs per insect at 20-25℃.

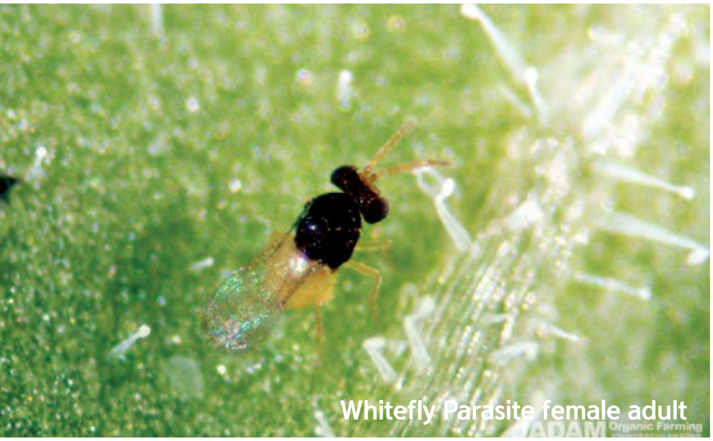
The egg of the parasite emerges after the third instar period, becomes a pupa in the host's body, and eventually becomes an adult and escapes outside the host's body. At the end of the larvae period, black pigment is discharged, and the body color of the host changes from white to black, so the presence or absence of parasites can be easily determined. Female adult worms spawn on the larvae of the greenhouse whitefly's late stage.

In addition, there is a tendency to avoid spawning on the parasitized host. The parasitized larvae blacken after 10 days at 23℃, and the adult emerges 11 days after blackening. Adults feed on nectar, which is the excrement of greenhouse whitefly larvae, and they kill the larvae with the ovipositor (spawning organ) and absorb their fluids. Their primary host for a nutrient is generally the second and third instar larva.

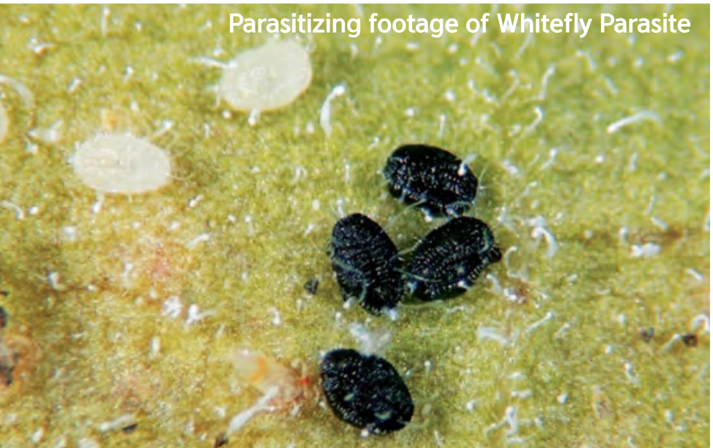
(Guide of utilizing natural enemies, Yongheon Kim)



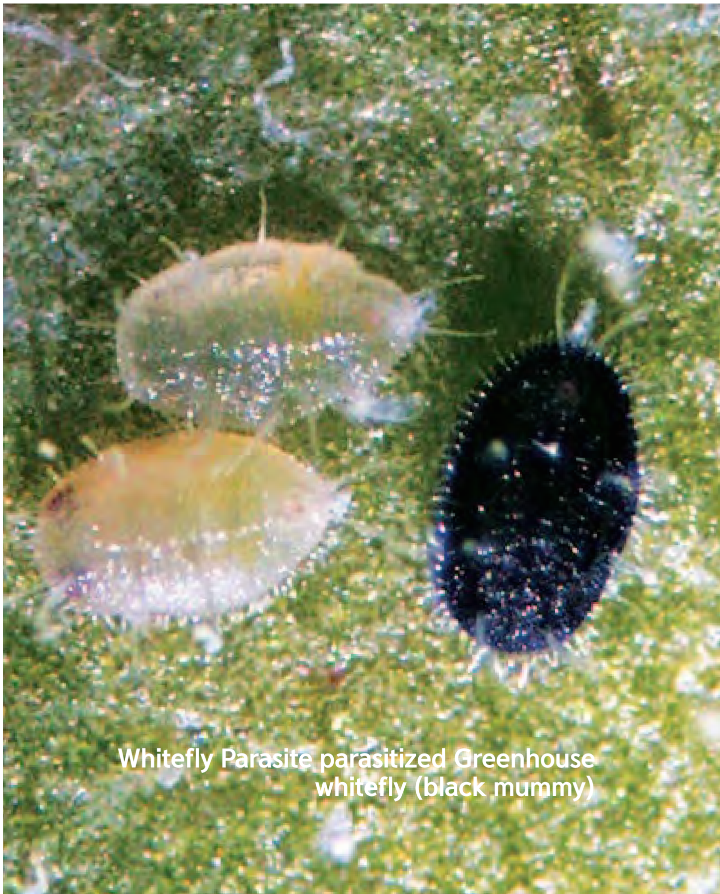
Death body of Greenhouse whitefly due to insect pathogenic fungi and spore disease. It naturally decrease when the humidity in the greenhouse increases to more than 80%.



Whitefly Parasite female adult



Parasitizing footage of Whitefly Parasite



Whitefly Parasite parasitized Greenhouse whitefly (black mummy)

Predatory gall midge

Feltiella acarisuga

Description

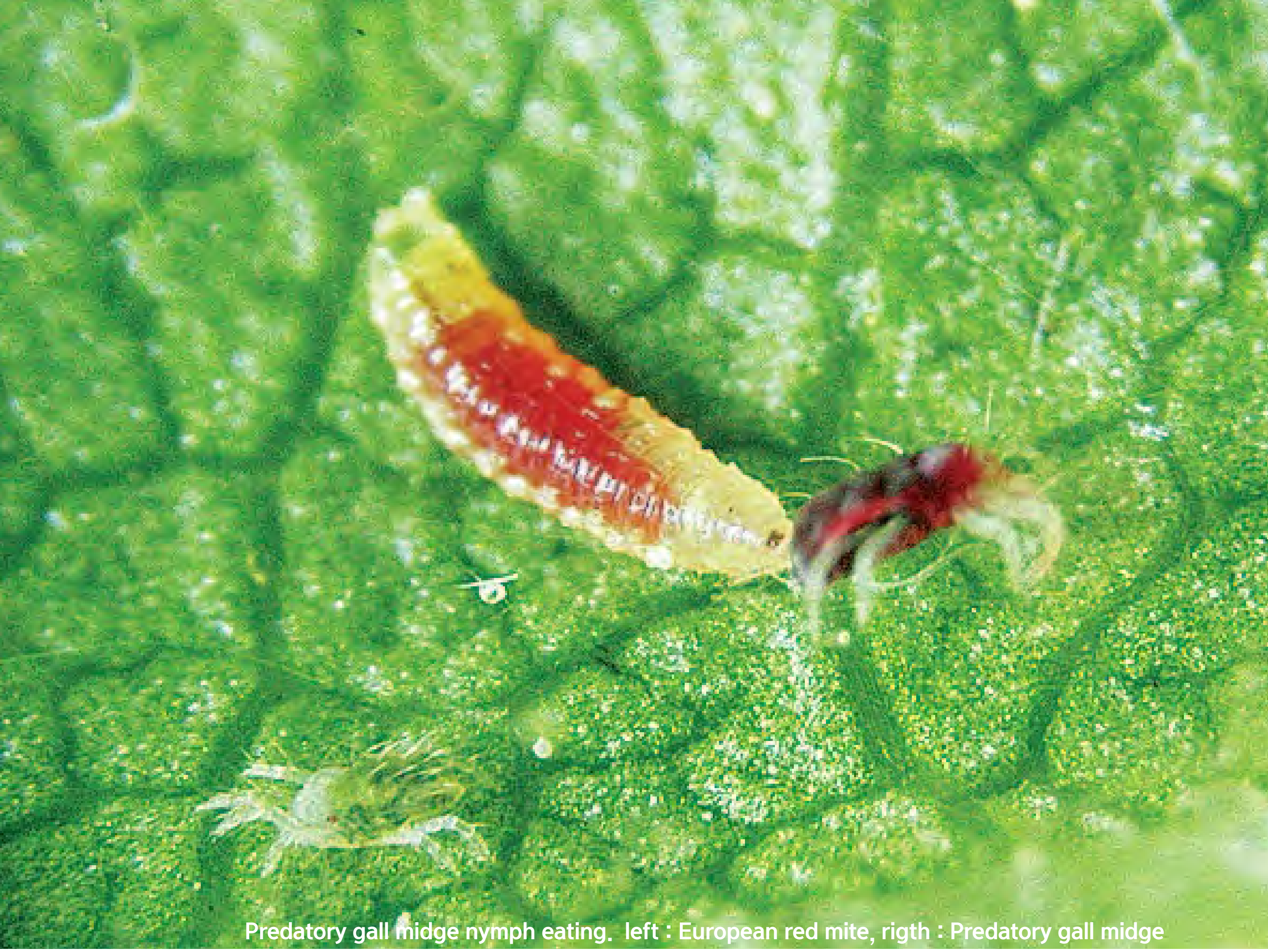
The egg is pale yellow, oval, and 0.2mm in size. It is attached to the back of the leaf, but it is not easy to observe with the naked eye. Full-grown larvae are about 1.5mm in size and may appear light orange or red. It can be seen on the backside of a leaf where mites are present. The pupa is a white cocoon and is attached to the edge of the leaf or the vein's corner. The pupa size is about 2~3mm.

Life cycle

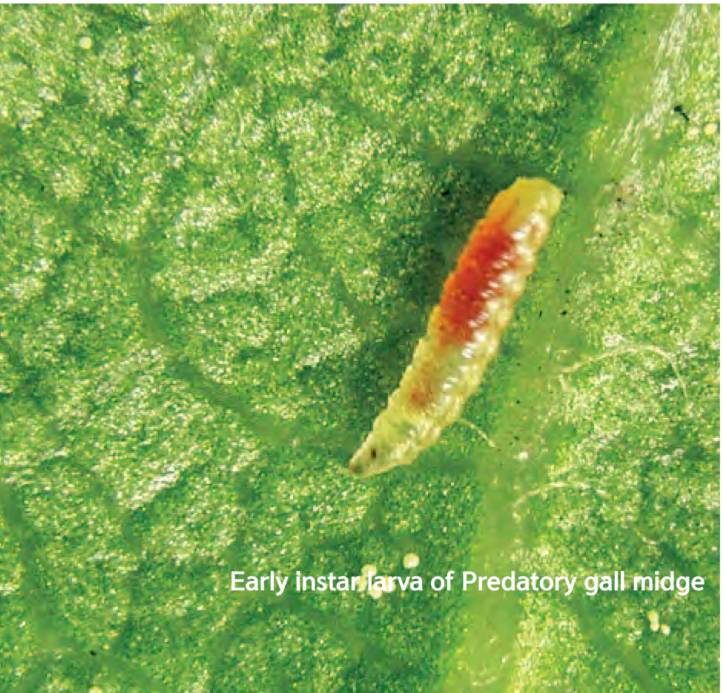
Larva and pupas (cocoons) are easy to find, but adults are difficult to find. The most common places are fields, apples, pears, grape orchards, and all crops and weeds in which mites occur. The optimum temperature range for mite flies is 20-27℃. The growth period from egg to adult at 27℃ takes about 10 days, and under 15℃ conditions, it takes about 30 days, and the change in development period varies according to temperature change. Growth stops below 8℃.

Adults and larvae are mosquito-type predatory natural enemies similar to the aphid midge. But unlike the aphid midge, it does not become a pupa in the soil but forms a cocoon on the back of the leaf and becomes a pupa in it. This species is known to be distributed worldwide, where mites can be found between May and September.

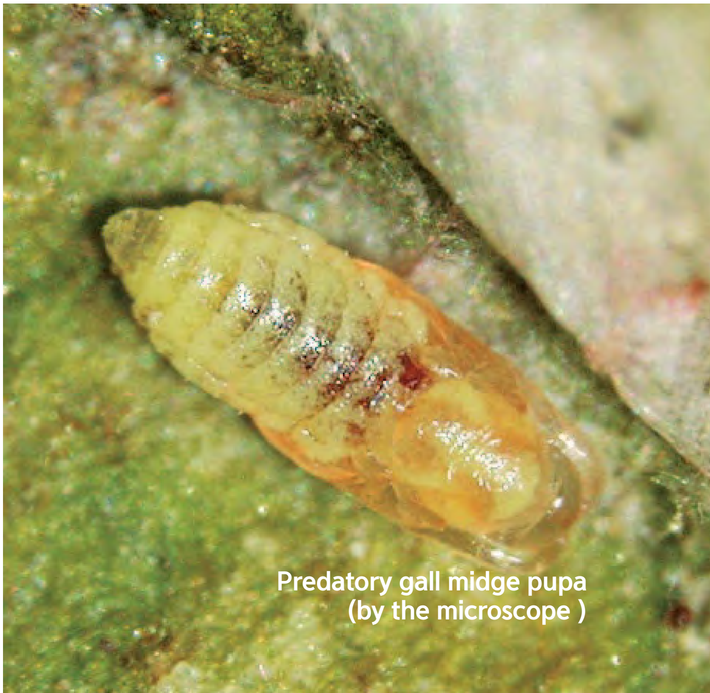
(National Crop Pest Management System/NCPMS)



Predatory gall midge nymph eating. left : European red mite, rigth : Predatory gall midge



Early instar larva of Predatory gall midge



Predatory gall midge pupa
(by the microscope)

Aphid midge

Aphidoletes aphidimyza

Description

Adults mate and spawn in the evening and at sunset. The eggs are laid under or next to the aphid. The size of the egg is 0.3×0.1mm, long and orange-red. The larva awakening from the egg is 0.3mm, making it difficult to find the first instar larva among the aphids. Newly hatched larvae may eat the nectar of aphids, but they must quickly find an aphid before it dries out.

The color of the larvae can be orange, yellow, red, brown, or gray, depending on the plant on top. The pupa is located within 1 cm below the soil, and at this time, it produces ovaries and makes brown cocoons. The cocoons surface is decorated with sand and aphid shells. It is 2mm long and is sometimes found near cocoon plants. The mortality rate is high during the pupa period. The length of adult insects are about 2.5mm, and the wingspan of females are 2.5~3.5mm, their legs are long and thin. Male's antennae are covered with long bent back hairs. In contrast, females are short and thin.

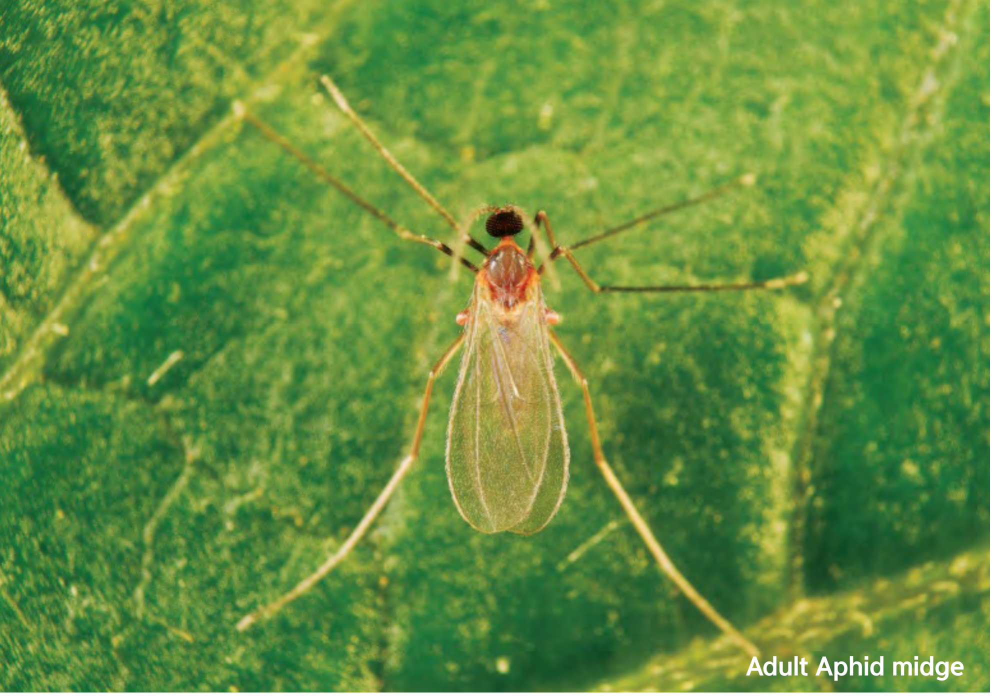
Life cycle

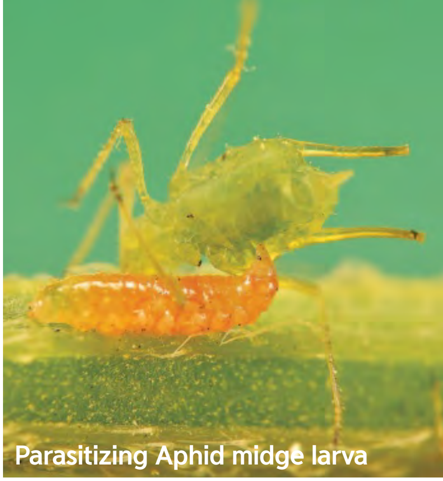
Aphid midges belong to the Cecidomyiidae family and are essential for the biological control of aphids in greenhouses. Larvae live most of their life on the surface of plants. Although some pest species create humps on plants, aphid midges are predators of aphids, scale insects, greenhouse whiteflies, mites, and other pests. There are 5 species of aphid midges predating aphids worldwide, including 4 Aphidoletes species and 1 Monobremia species. The aphid midge is the most well-known species capable of controlling dozens of aphid species on several crops. It was first discovered in 1847 and named Cecidomyia aphidimyza, but is now called Aphidoletes aphidimyza. It is known to predate on 60 species of aphids.

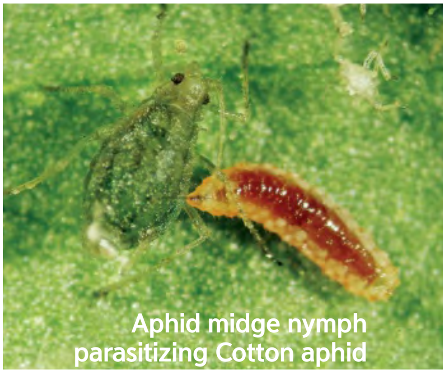
They do not live up high from the ground, instead, they live between plants. They live in greenhouses from May to September. The first appearance of aphid midge is from May to June to the end of September and is found in many crops. At the end of September, the larvae enter a depth of less than 2cm below the soil, become a pupa, and reappear in May of the following year. Dormancy begins in late autumn and ends in early spring in the greenhouse. They are active during the summer when the temperature in the greenhouse is high, and dormancy occurs at a single time when the temperature in the greenhouse is low. The growth of Aphid midges is affected by temperature, host density, and humidity. At 21℃, the egg period takes 2 to 3 days, the larvae take 7 to 14 days, and the pupa period takes 14 days, and the entire generation period is about 35 days.

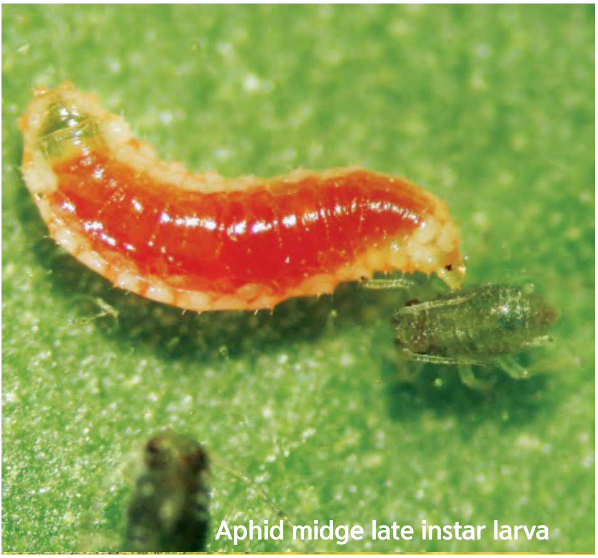
In general, the amount of aphid predation of hump flies is 10 to 100 in a day and is affected by the host's temperature, humidity, and density. About half of the amount of predation occurs during the last larvae stage. The aphid midge larva kills very effectively, and it takes about a few minutes to two hours to prey on one aphid, depending on the age of the aphid midge and the size of the body. It cannot live on mites and scales but can live on more than 60 species of aphids.

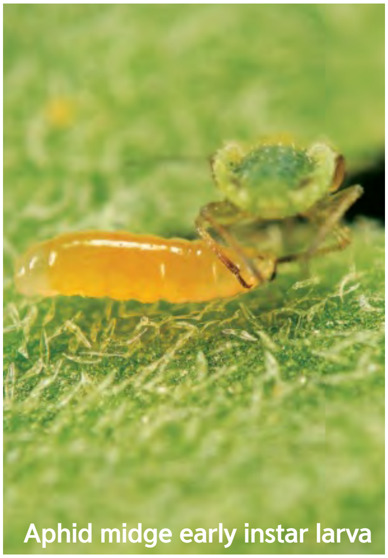
(Guide of utilizing natural enemies, Yongheon Kim)

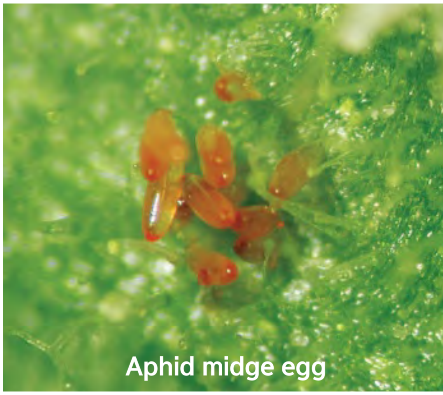

Adult Aphid midge

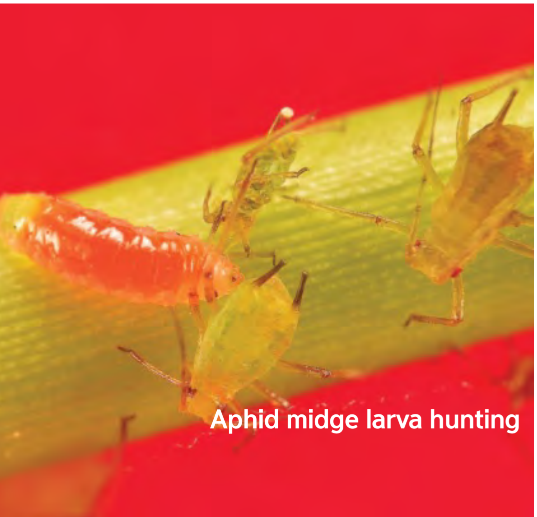

Parasitizing Aphid midge larva

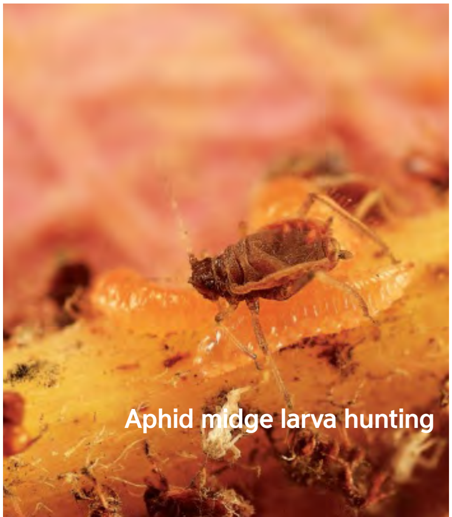

Aphid midge nymph
parasitizing Cotton aphid

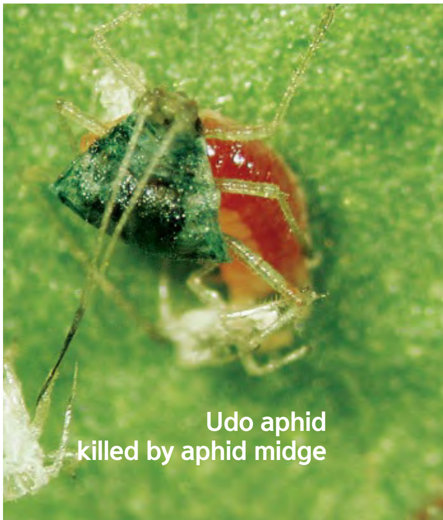

Aphid midge late instar larva


Aphid midge early instar larva


Aphid midge egg


Aphid midge larva hunting


Aphid midge larva hunting


Udo aphid
killed by aphid midge

Phytoseiulus persimilis

Description

The egg is oval, 0.2mm long, and milky white. It is about twice as large as the spotted mite egg. The larva has 3 pairs of legs and 4 pairs of legs from the first nymph stage. When female adult insects first become elongated, they become close to the original form when predation begins.

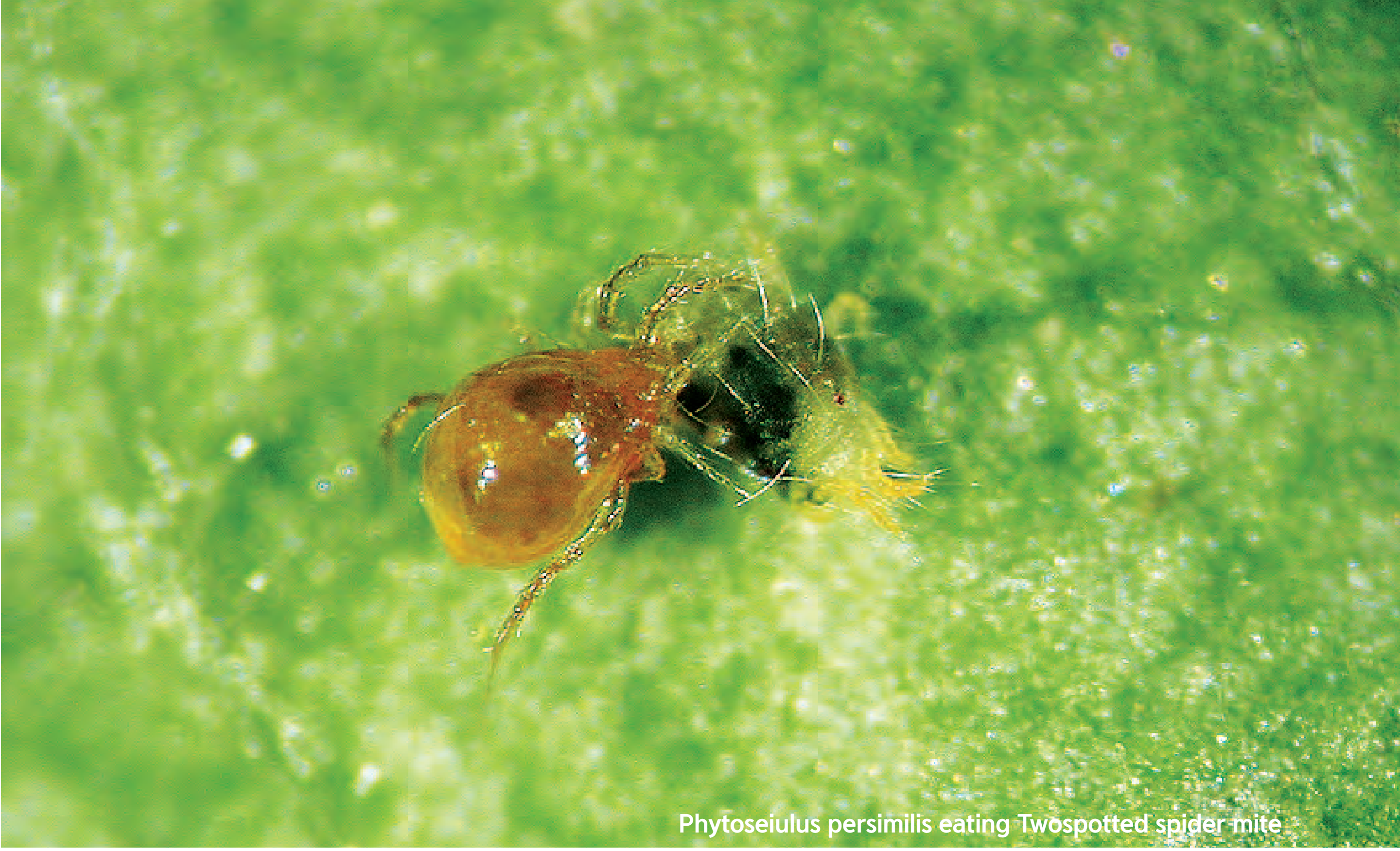
Life cycle

Their development stages sequences are egg, larvae, first instar nymph, second instar nymph, and adult. It takes about 7 days from egg to adult at 25℃, and the number of spawn are 50-60, and their lifespan is 30-40 days. The nymph and adult of predatory mites eliminate target mites by sucking the body fluids of all generations, such as spotted mite, tea mite, nymph, and adult. Adults predate about 30 eggs, 20 nymphs, and 5 adults a day on average.

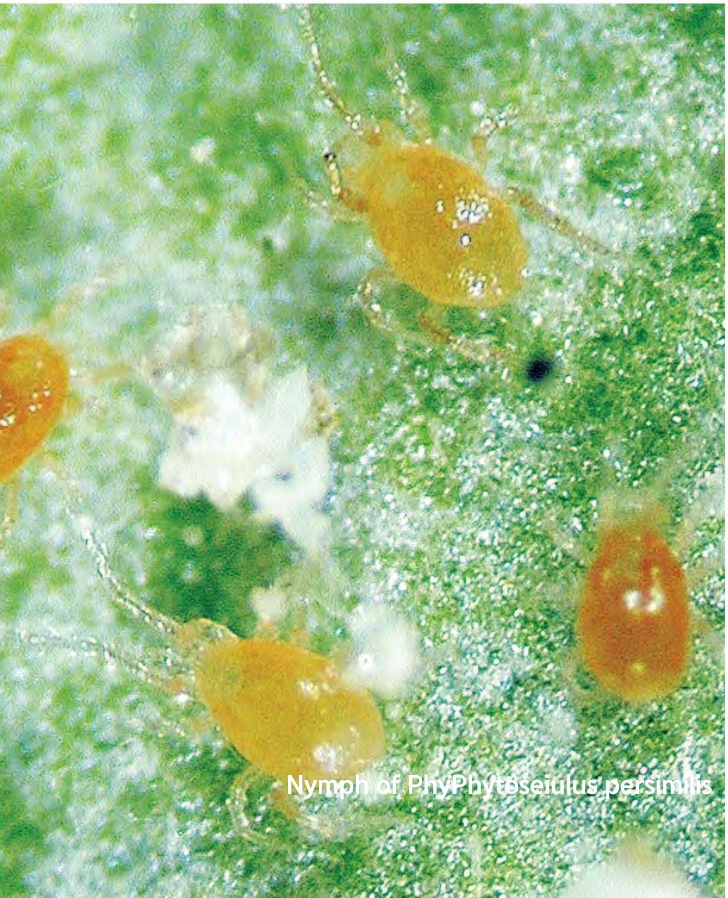
It is possible to check the predatory mites around the affected leaves with the naked eye or magnifying glass, and they are more active than the two-spotted spider mite and move faster. Dead two-spotted spider mites on the back of the leaves are sometimes seen as brown to black spots. The optimum environment for spawning is when the relative humidity in the greenhouse is 75%, and the temperature is over 20℃. At 25℃, the egg period is 2.26 days, the larvae are 0.68 days, the first instar nymph 1.12 days, and the second instar nymph 1.31 days. The period before spawning is 1.5 days, the spawning period is 21.6 days, and the period after spawning is 13.1 days, and the total survival days of adults are 36.4 days. The number of spawn during a lifetime are 79.5 in total, and the number of spawn per day are 3.7. The life span at 20°C is longer than that of the two-spotted spider mite and produces more eggs, so it is suitable for biological control due to its high reproductive rate.

The optimum temperature is 20~25℃, but considering the spotted mite's growth rate, the growth effect is best at 20℃. The optimum humidity is above 75%, and the hatching rate is extremely low at humidity below 40%. As the food density increases, the attack rate decreases, the success rate is not significantly affected by the density. when larvae cannot eat, they start to eat whole nymphs. Adults eat all the instar of leaf mites, but nymphs do not eat adult mites, only eggs, larvae, and nymphs. It eats leaf mite eggs the most, and the amount of predation of adult leaf mites is low. When it is over 30℃, the amount of predation decreases, and at 35℃, It stops hunting for mite. If the food density is more than 5, the predator's nymph is about 4, and if there are 30 leaf mite eggs (prey), the number of predation is about 20 eggs per days. When there is no more food for the predatory insect, the insects likely to be disappear within 10 days.

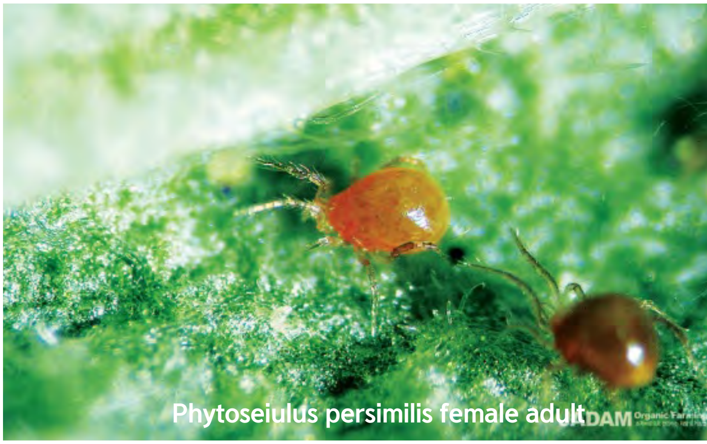
(Guide of utilizing natural enemies, Yongheon Kim)



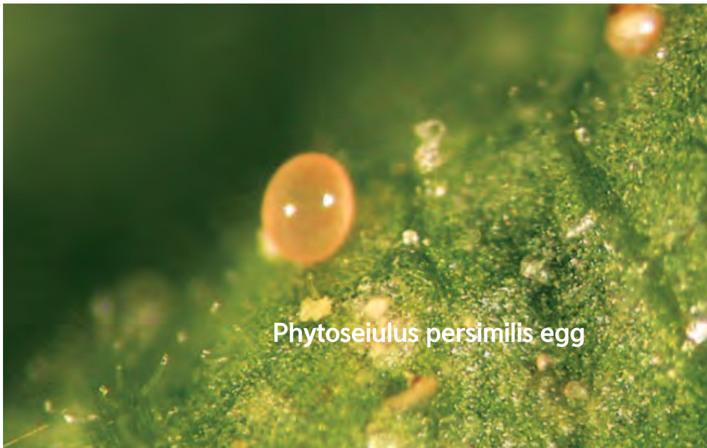
Phytoseiulus persimilis eating Twospotted spider mite



Nymph of PhyPhytoseiulus persimilis



Phytoseiulus persimilis female adult



Phytoseiulus persimilis egg

Sevenspotted lady beetle

Coccinella septempunctata

Description

The body length is 5~8.5mm. The body is in the shape of a short egg, and the whole body seems to be upside down. The head is black, but there are diagonal yellowish-white patterns on both sides of the forehead. The head width is 1/2 of the pronotum, and there are dense spots. The anterior and posterior corners of the pronotum are chamfered, and the dorsal surface is shaped like a shark shell, with deep and dense spots.

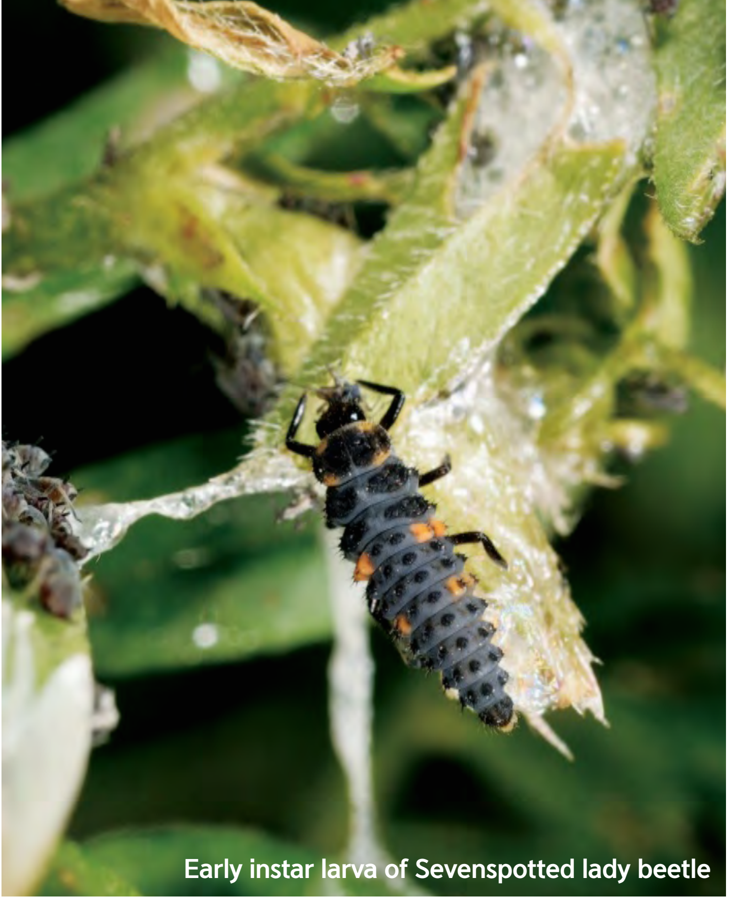
On the hard outer wing (elytra), there is one black pattern on both sides of the bottom of the line where the two wings meet each other, and there are three black patterns on the left and right symmetrically, so it seems that there are 7 black patterns. The spot pattern on the elytra is more sparse than the pronotum. This is where the name 'Sevenspotted Lady beetle' comes from.

Life cycle

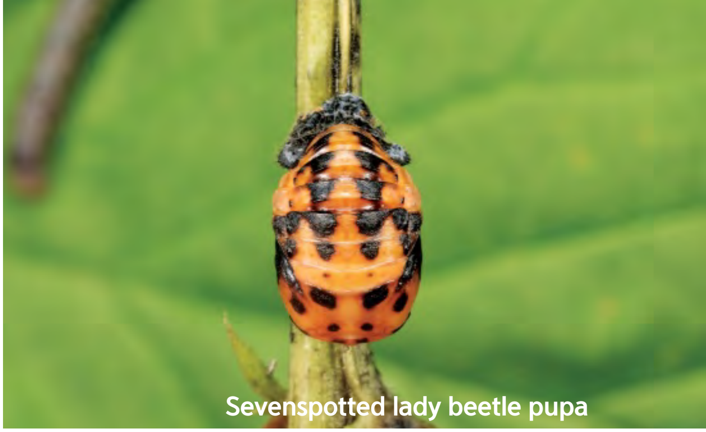
The female lays 200-1000 eggs in about 1-3 months of spring and early summer. It is spawned in between many aphids, and hatched larvae eggs grow from 1mm to 4-7mm for 10 to 30 days. Large larvae can climb up to 12m above the ground in search of food. About 1 month after hatching, it becomes a pupa, but after 3 to 12 days, it flies and becomes an adult bug.

It lives in weedy areas in fields and mountains or places with aphids. It can be seen from early spring to autumn, but the population especially increases in May. Both adults and larvae are natural enemies that eat aphids. Adult insects winter under fallen leaves, cracks in stones, and cracks in buildings. It is one of the most common species of ladybugs in the world. It is wrapped in a colorful shell. When faced with danger, it suddenly falls to the ground and pretends to be dead. After a while, if an enemy touches its body, it spews out a liquid with a nasty bitter taste and smells from between its leg joints.

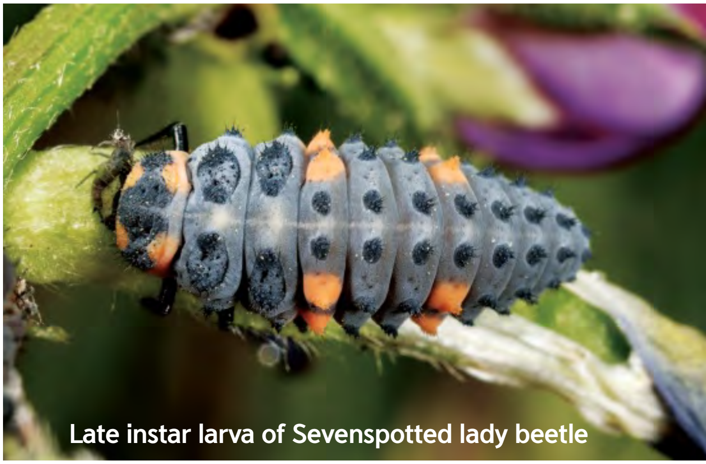
(Deogkee Park)



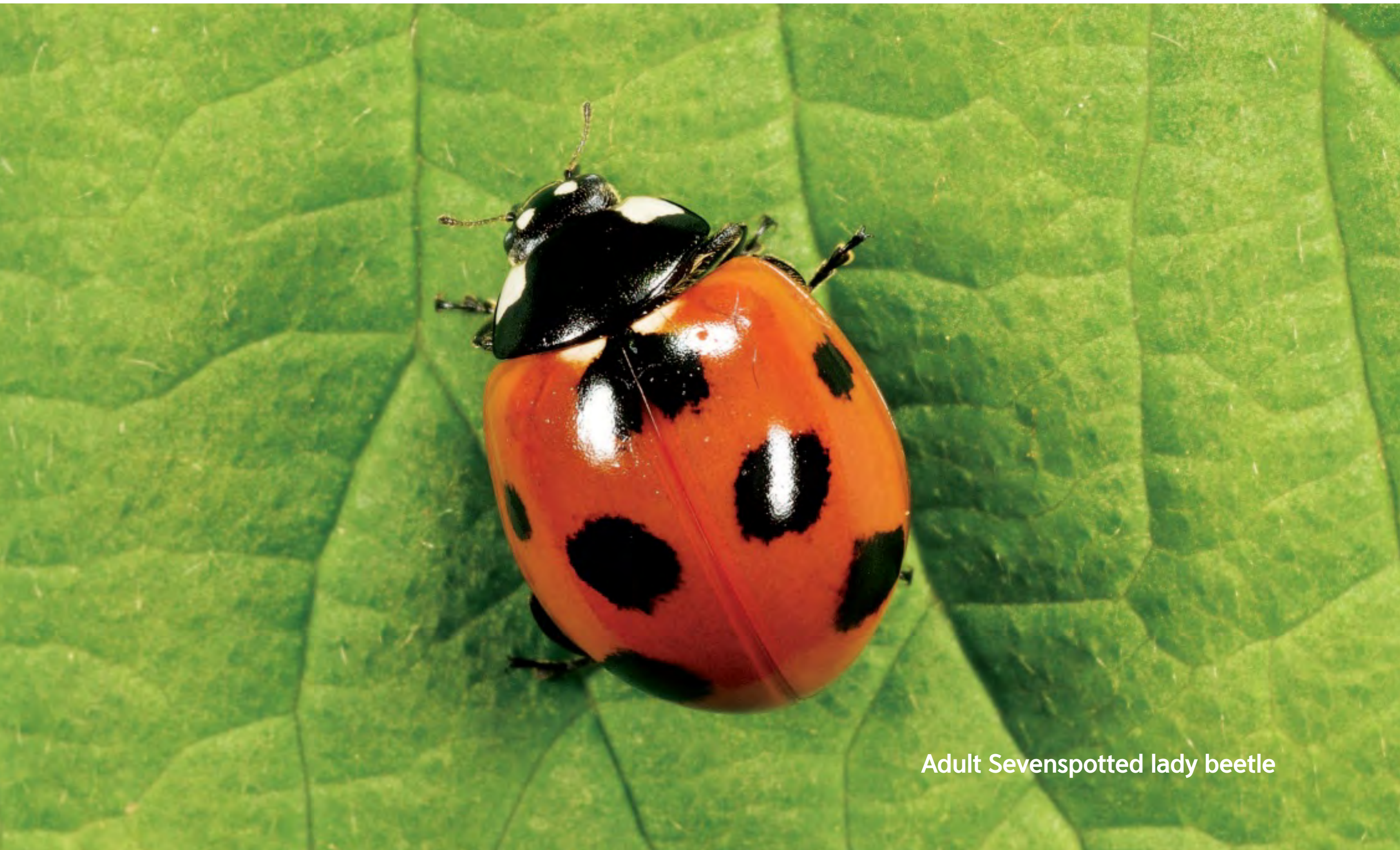
Early instar larva of Sevenspotted lady beetle



Sevenspotted lady beetle pupa



Late instar larva of Sevenspotted lady beetle



Adult Sevenspotted lady beetle

Aphidius colemani

Description

Aphidius colemani belongs to the Braconisomere family, the adult insects are slightly thin, the veins are not clear, they have long antennae, and the body color is black. The size is slightly different depending on the host, but it is about 2mm. It spends an egg and pupa period in the body of aphids, and when they become adults, they penetrate the epidermis of aphids from inside to come out. The larva passes through 4 instar stage. The adult insect is 3~4mm, and the body color is black.

Aphidius colemani is used for cotton aphids or peach aphids, Aphidius ervi is used for beard aphids, and Aphidoletes aphidimyza, a kind of Cecidomyiidae, is used in high temperatures. Grass dragonflies (Chrysoperla carnea) and ladybug (Harnonia axyridis) are used as predators as well.

Life cycle

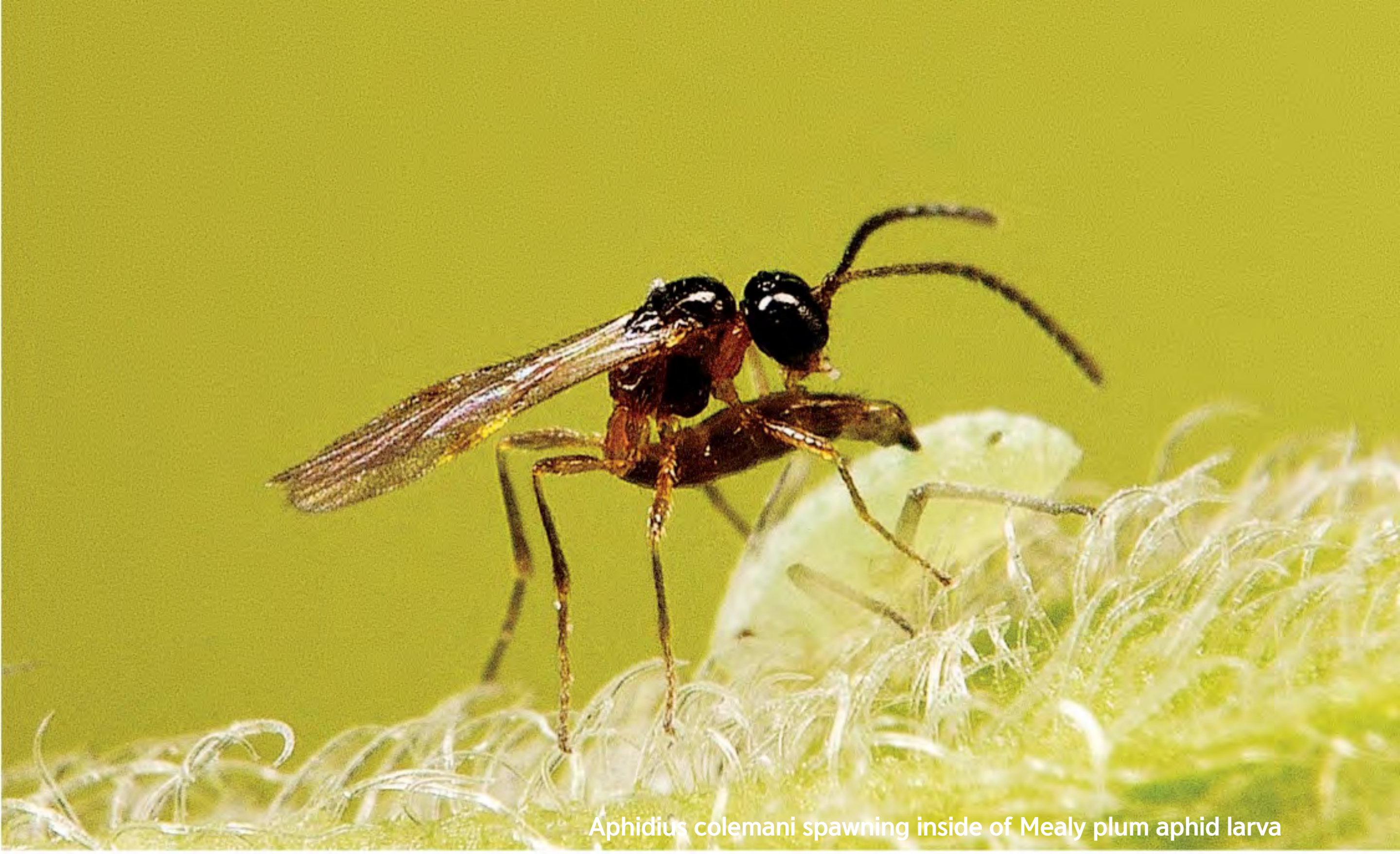
The females lay eggs on aphids by bending the abdomen under the legs using the ovipositor (spawning organ). It spawns on both adult aphids and nymphs. Parasitized aphids eat more and secrete more nectar. The parasitized aphid adult and the fourth instars nymph continue to spawn. The Aphidius colemani larvae do not fatally suck on aphids. After 7 days of parasitization at 21℃, it attaches the aphid on a leaf and makes a cocoon on the inside, causing the host body to inflate.

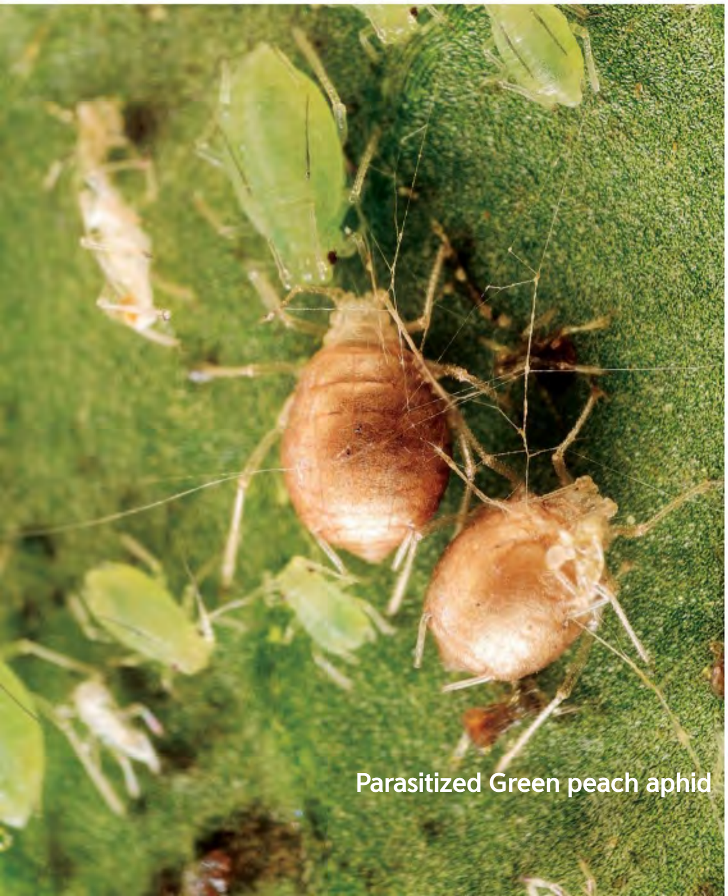
The number of offspring of this natural enemy(beneficial insect) is 388 at 25℃, and more than 302 at 20℃. The growth period of larvae is 12.7 days for females at 20℃ and 12.6 days for males, 10.0 days for females and 9.6 days for males at 25℃. The larval mortality rate was 14.1% at 20℃ and 27.8% at 25℃, and the mummy mortality rate was 1.5% at 20℃ and 6.6 days at 25℃, all of which were high at 25℃.

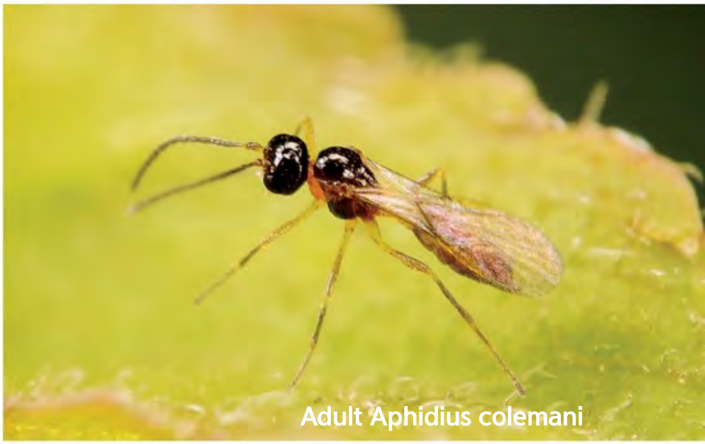
The lifespan of adult worms is 5.8 days at 20℃ and 4.4 days at 25℃. Aphidius Colemani bred on cotton aphids, starts to die 3 days after the emergence, and no individuals survive more than 9 days after emergence. As a result, the number of daily offspring by temperature was 149.7 on the 1st day of emergence, 92.7 on the 2nd day at 20℃, most of them complete spawning within 2 days after emergence, and a few individuals spawn after 5 days.

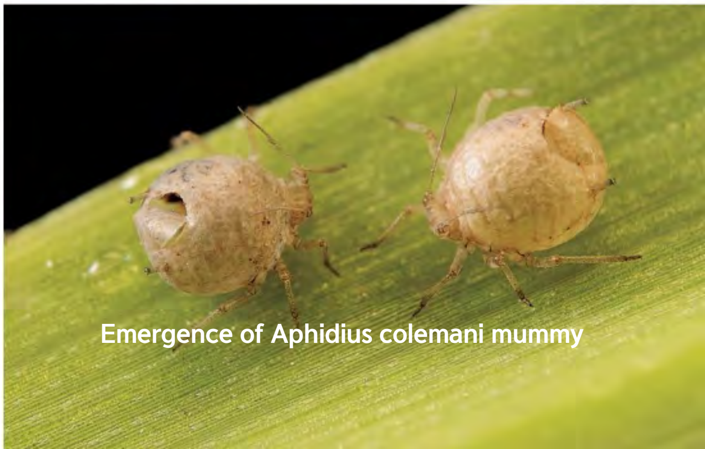
Similarly, at 25℃, 171.1 eggs were spawned on the first day of emergence, and 134.5 eggs were spawned on the second day of emergence, and the number of eggs gradually decreases after the third day. Most of the Colemani aphids spawn only one egg per cotton aphid. Occasionally, two or more aphid bee larvae are found in one host, but the number is extremely small.

(Guide of utilizing natural enemies, Yongheon Kim)


Aphidius colemani spawning inside of Mealy plum aphid larva


Parasitized Green peach aphid


Adult Aphidius colemani


Emergence of Aphidius colemani mummy

Hoverfly

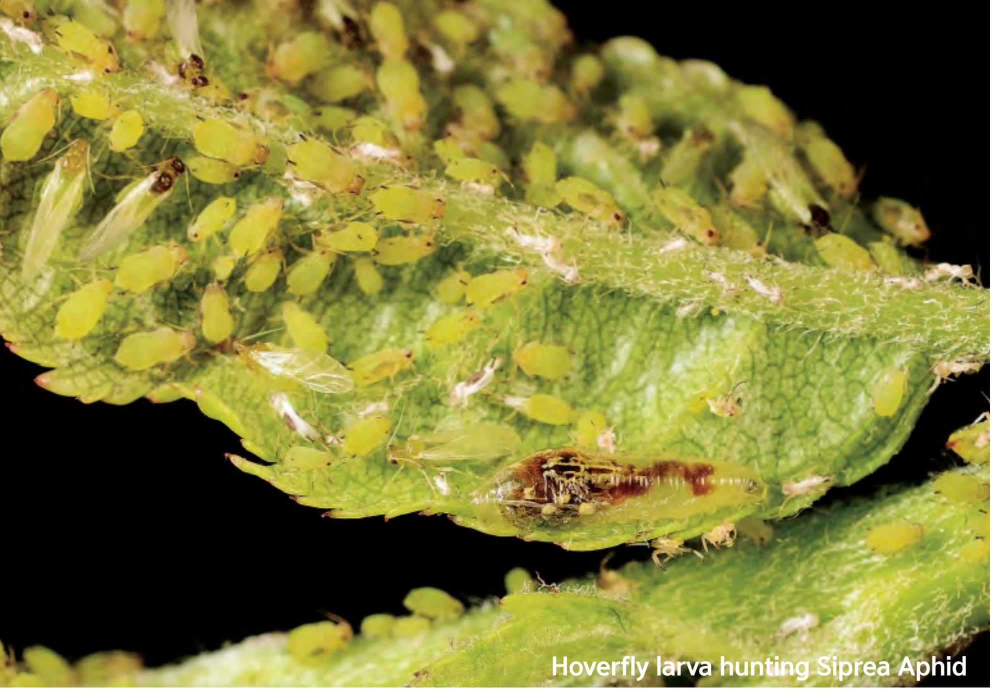
Allograpta balteata

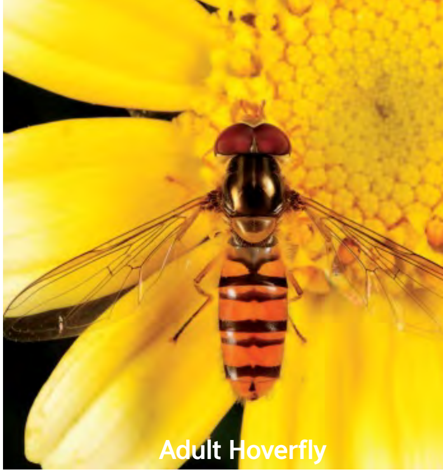
Description

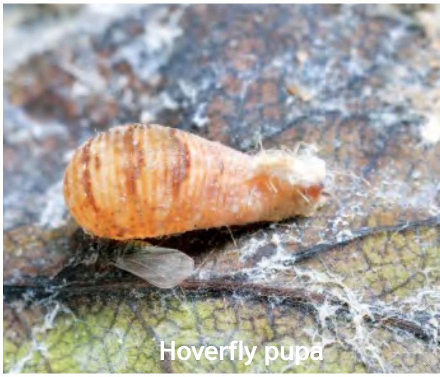
Although the shape of a hoverfly is similar to a bee. It is an insect belonging to the insect Order Diptera, and it is also called a hoverfly because the imago flies rapidly from flower to flower. Larvae are natural enemies of aphid predation, and in the Netherlands, they are commercialized as natural enemies for biological control of aphids.

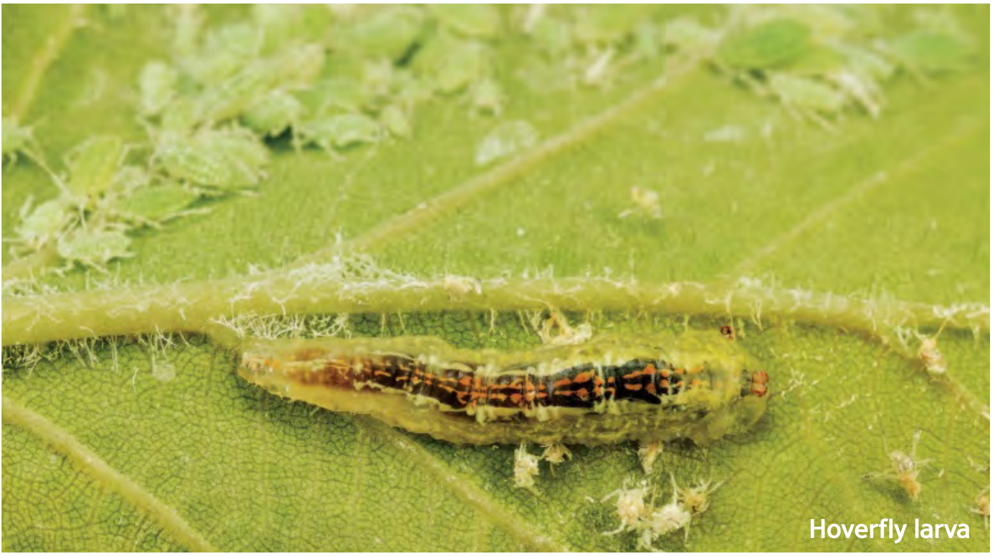
Adult insects are about 10-20mm long. Their head and thorax are black, their abdomen has yellow and black stripes, and their wings are spread out when resting. The length of an egg is about 1mm, it is in the shape of a white oval sausage, and it lays eggs where aphids are clustered. The larva is 10-20mm, and it sucks up body fluid by stabbing a needle (stylet) into the aphid. The pupa has a pear-shaped brown-orange color with a dark band and can be observed on the leaves.

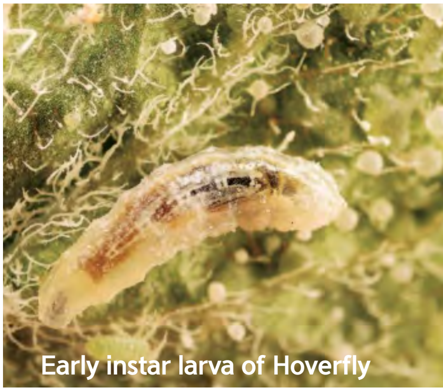
(National Crop Pest Management System/NCPMS)

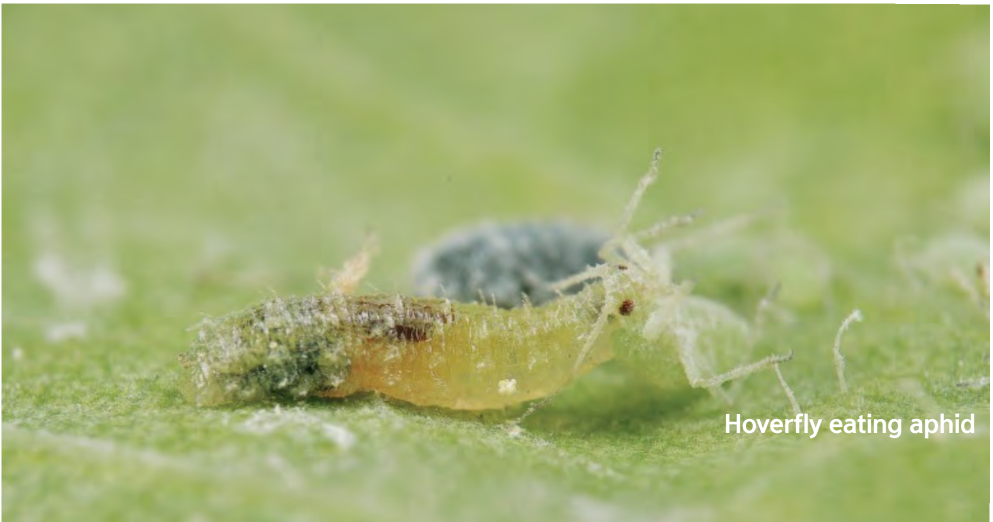

Hoverfly larva hunting Siprea Aphid

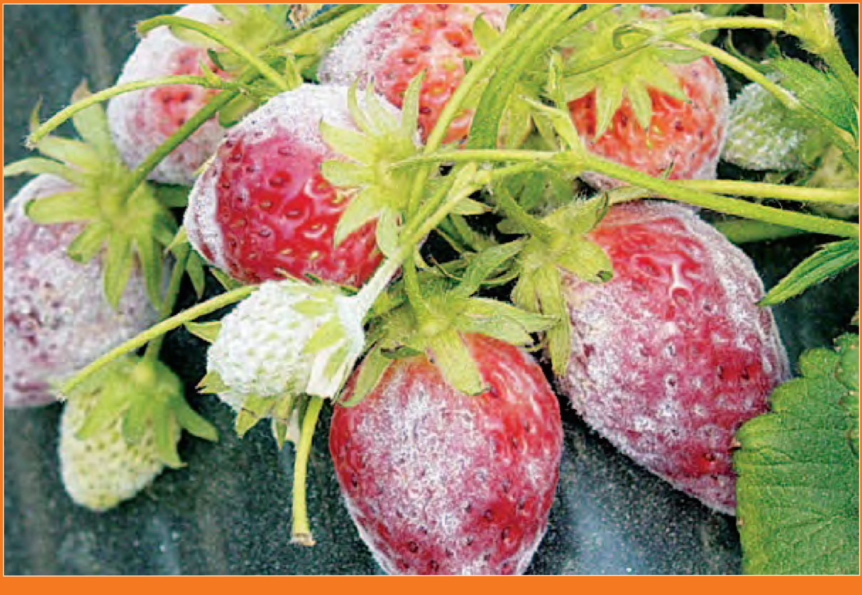

Adult Hoverfly


Hoverfly pupa


Hoverfly larva


Early instar larva of Hoverfly


Hoverfly eating aphid



Diseases

Microorganisms that cause diseases in plants include fungi, bacteria, phytoplasma, viruses, and viroids. This causes damage such as decreasing yields, declining growth, and withering. In some cases, bacteria and fungi are called pathogenic bacterium and viruses or other organisms are classified as a pathogenic organisms.

In a broad sense, plant pathogenic organisms include all living organisms that cause diseases in plants such fungi, bacteria, protozoa, nematodes and viruses. Plant pathogenic fungi decrease the yield of global crops more than 10% a year. Each pathogen can act alone or cause more serious damage when two or more factors act in combination. Infection occurs in various ways depending on the type of pathogen, and in most cases, the type of infection can be judged according to the symptoms of the diseased plant. Infection can occur in various areas such as plant tissues, surfaces, stems, or roots, and severe cases can cause wither and tissue necrosis, browning, and fruiting reduction. (NAVER Microbiology Encyclopedia).

Black spot

Phoma citricarpa var

Symptom description

A small irregular black pattern is formed on the leaf, the edge of the pattern becomes pale yellow, and it also makes a double round pattern. Fruits have black spots on the surface, young fruits are hardened and split, and mature fruits are withdrawn and fall off early.

The most common pathogen is in the genus Alternaria. This fungus occurs in cabbages, turnips, cabbages, radishes, pears, cotton flowers, green onions, carrots, vines, mallow, celery, and asparagus. The Ceratotomella genus mainly occurs in sweet potatoes and taro, and the genus Cercospora occurs in chrysanthemums, causes a lot of damage.
(National Crop Pest Management System/NCPMS)

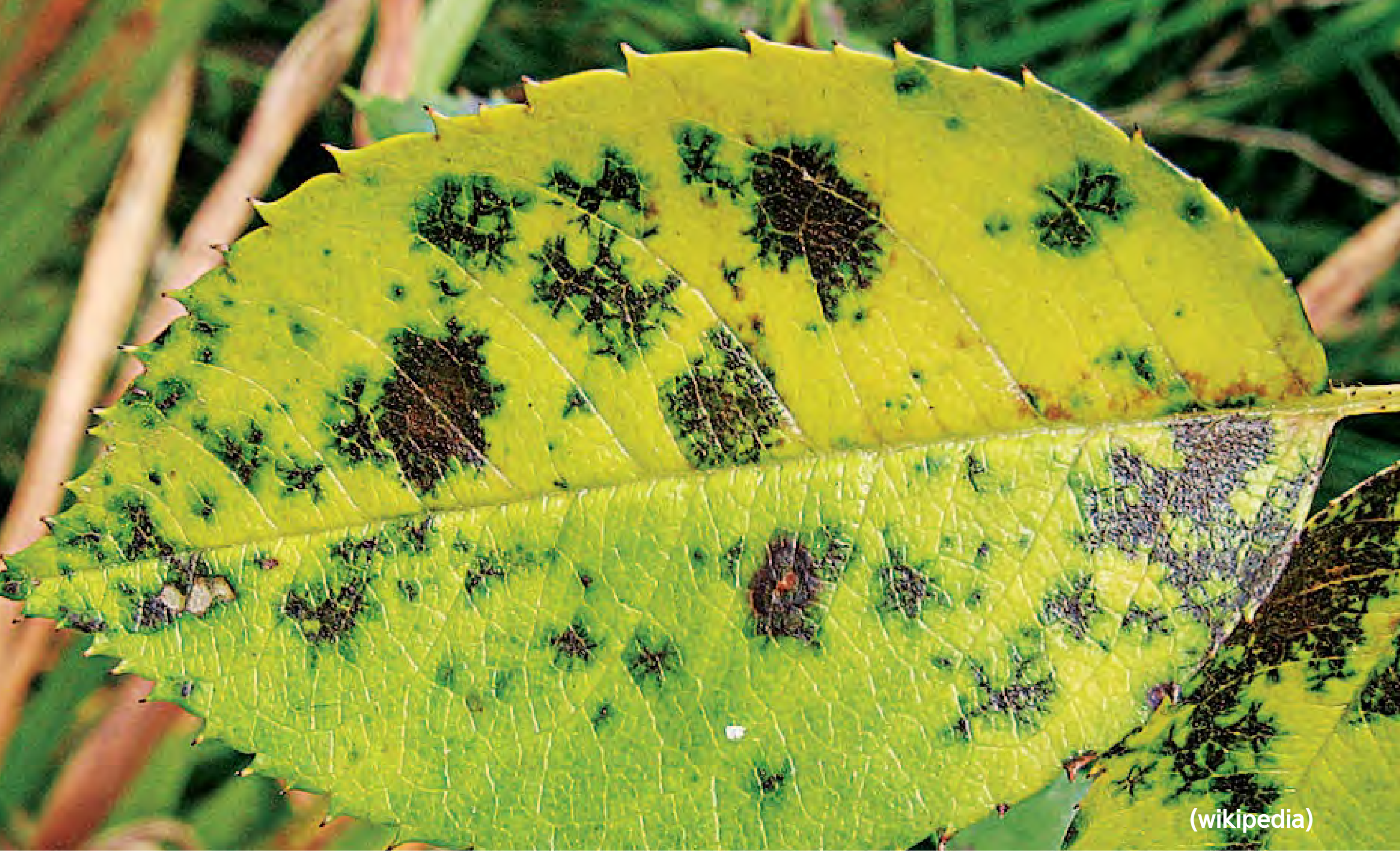
JADAM Natural Control Ratio

Refer to pages 25, 35~37

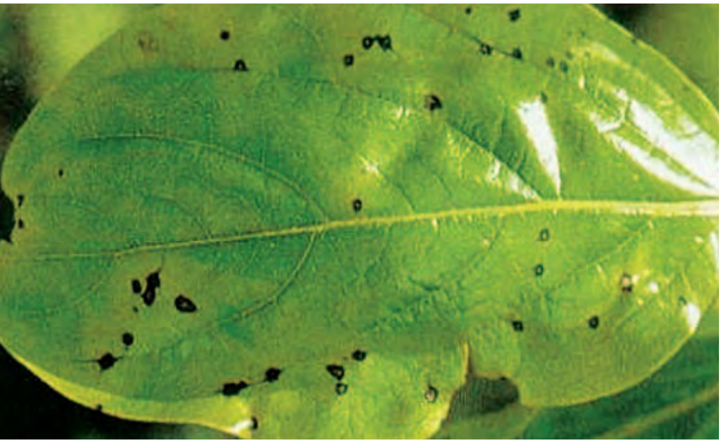
Standard (20L)	Prevention	Infestation	Emergency
JS		30ml	40ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			60g
Control interval	7days	**Visible effect**	2~3days

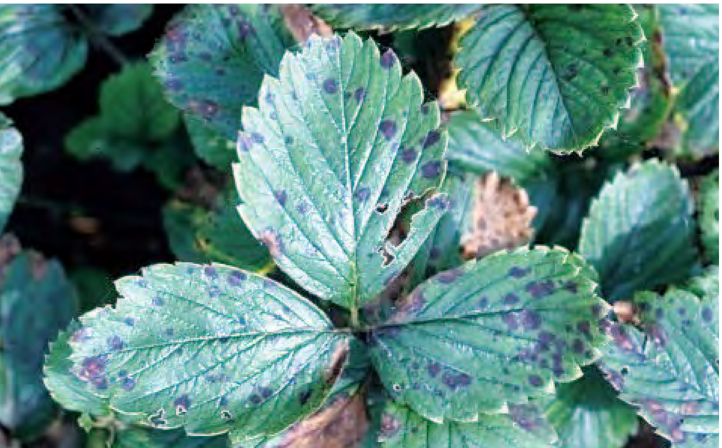
- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

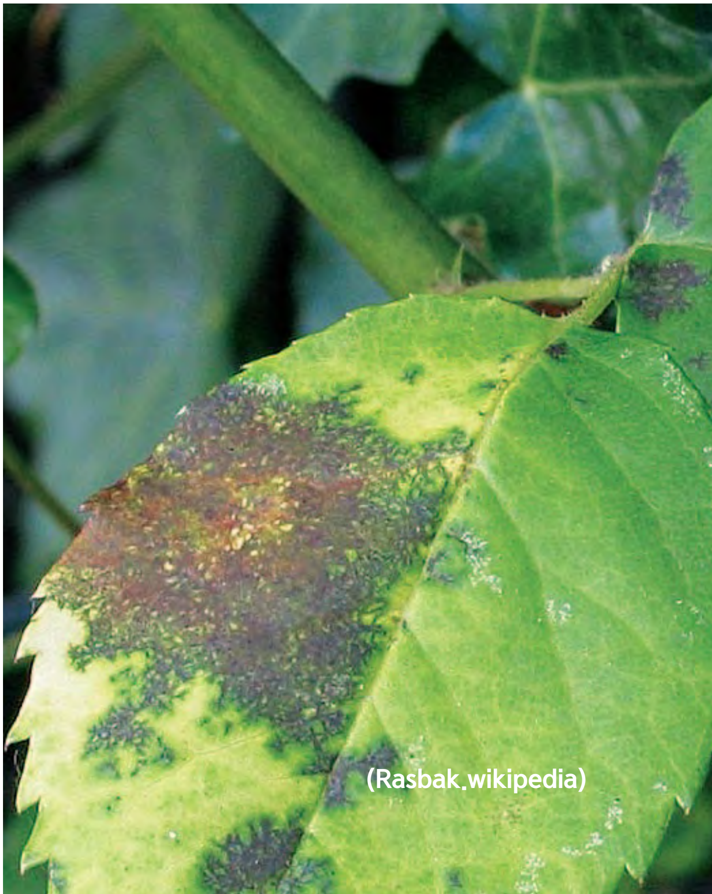
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



(wikipedia)







(Rasbak,wikipedia)

Black spot (Banana)

Black sigatoka

Symptom description

Black sigatoka is a leaf-spot disease of banana plants caused by the ascomycete fungus, Mycosphaerella fijiensis (Morelet). The pathogen Mycosphaerella fijiensis causes streaks that run parallel to the leaves. It is an ascomycete fungus that affects banana trees specifically in tropical climates; including Asia, West Africa, China, and South America. Tropical weather is the preferred climate for banana cultivation, but it is also the environment where this pathogen thrives: hot and humid, with plenty of rainfall to aid in dispersal.

The fungus infects mature banana leaves and will continue to cause infection without proper control. In the early stages of the infection of the plant, the lesions have a rusty brown appearance and appear to be faint, paint-like specks on the leaves. They become more visible on the undersides of the banana leaf as the lesions and leaves grow. The spots on the undersides of the leaf are the fungus itself. The pathogen then survives on dead plant tissue as mycelium.

The dimensions of the lesions are characteristically 20 x 2mm with a well defined wall surrounding them. After further development, they become darker, sink into the leaf, and turn into depressions. Leaves with large infectious lesions will start to degrade and collapse because the leaf spots interrupt the plant's ability to perform photosynthesis, leading to the ultimate death of the plant.
(wikipedia)

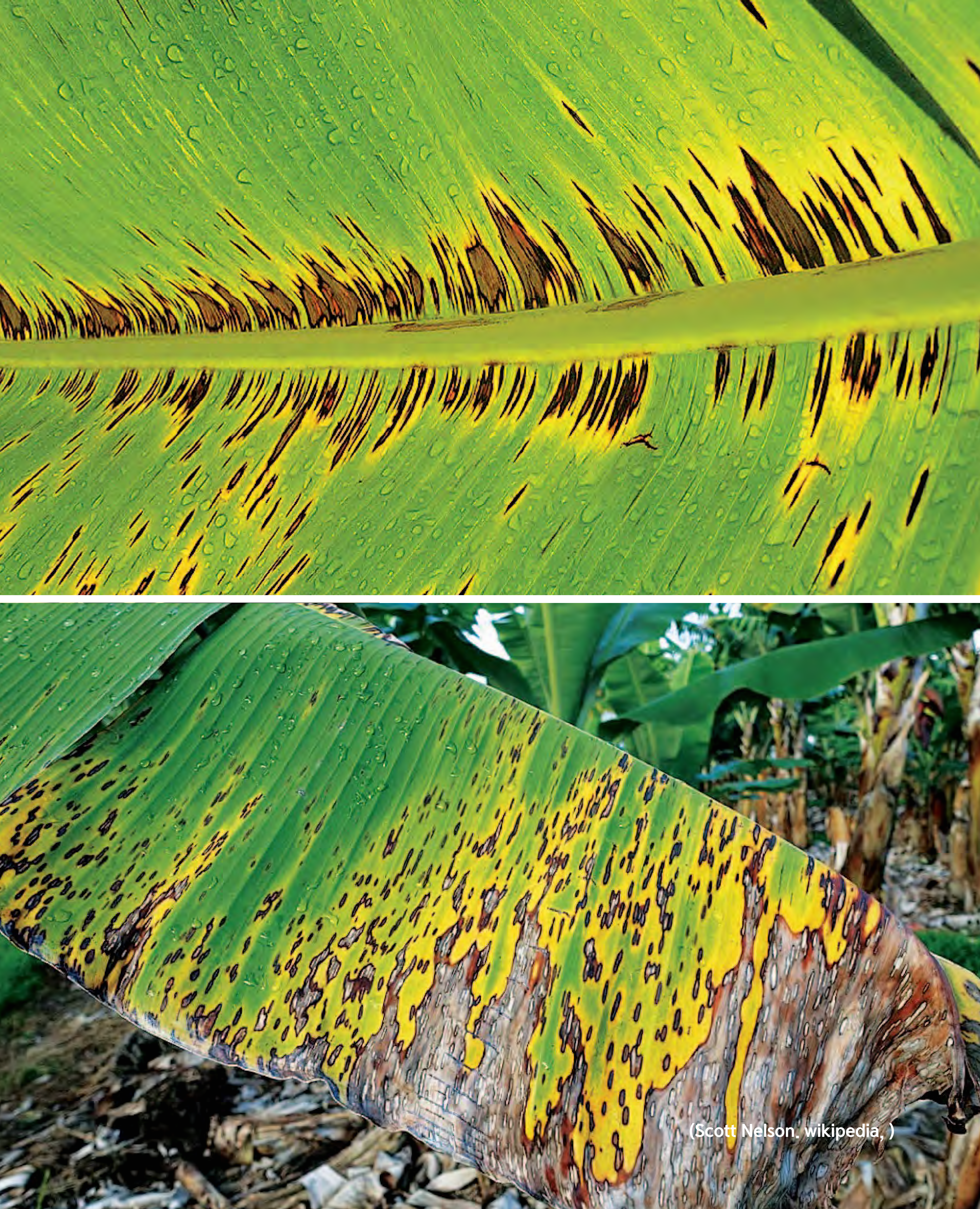
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3~4days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



(Scott Nelson. wikipedia,)

Papaya Black spot

Asperisporium caricae

Symptom description

spot, also known as Asperisporium caricae. This pathogen is found worldwide including, North and South America. Asia, Africa, North America, Latin America, Caribbean, Oceania, Australia, Fiji, French Polynesia, New Caledonia, and the Solomon Islands. Its primary host is papaya.

Leaf spots of 3-6mm in diameter, round or irregular, occur on old leaves. It is a pale brown color with a yellow margin. Spores develop below, turning the spots dark brown or black. If the leaves are severely infected, they turn brown and die. The fruit spots are also brown to black, slightly subsided. Spores on the underside of leaves are spread by wind and rain.

In general, this disease is a minor problem, but the leaves get heavily stained and fall off a lot. When this happens, it affects the tree's growth and decreases fruit yields of the tree. Infected young fruit can fall off the plant. Infection of mature fruit degrades value. The disease is severe in humid weather. (www.pestnet.org)

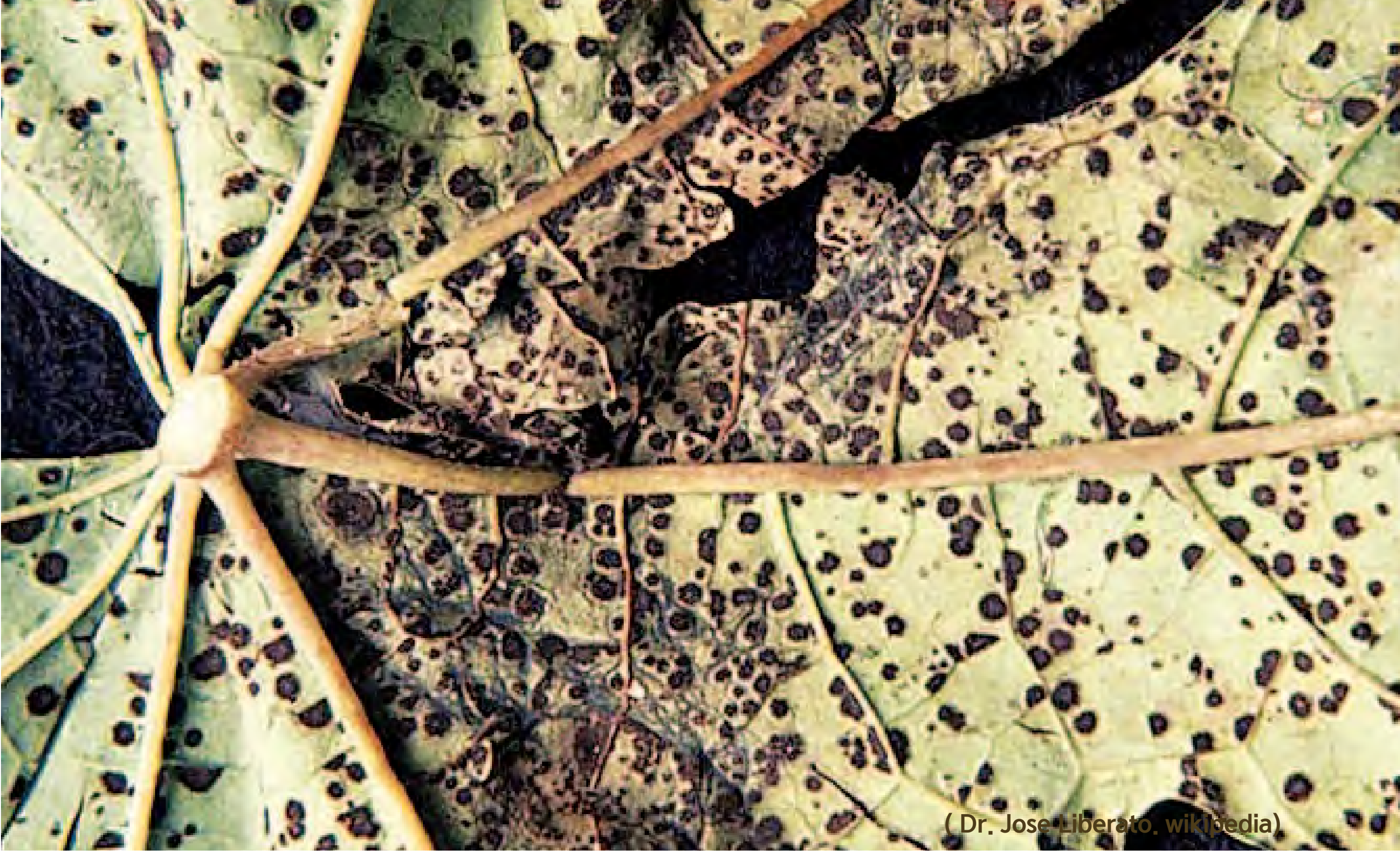
Refer to pages 25, 35~37

JADAM Natural Control Ratio

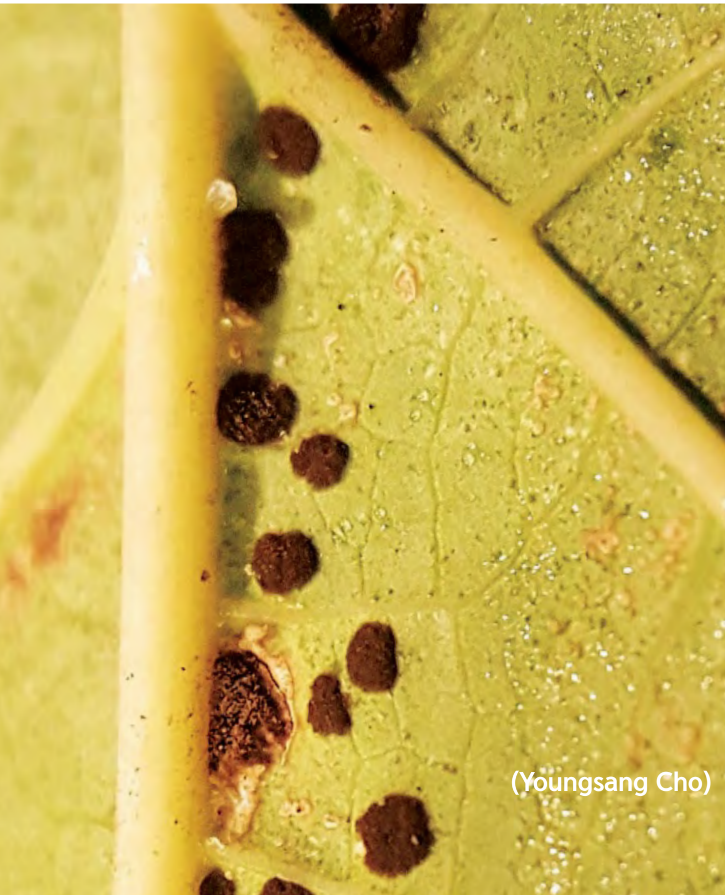
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

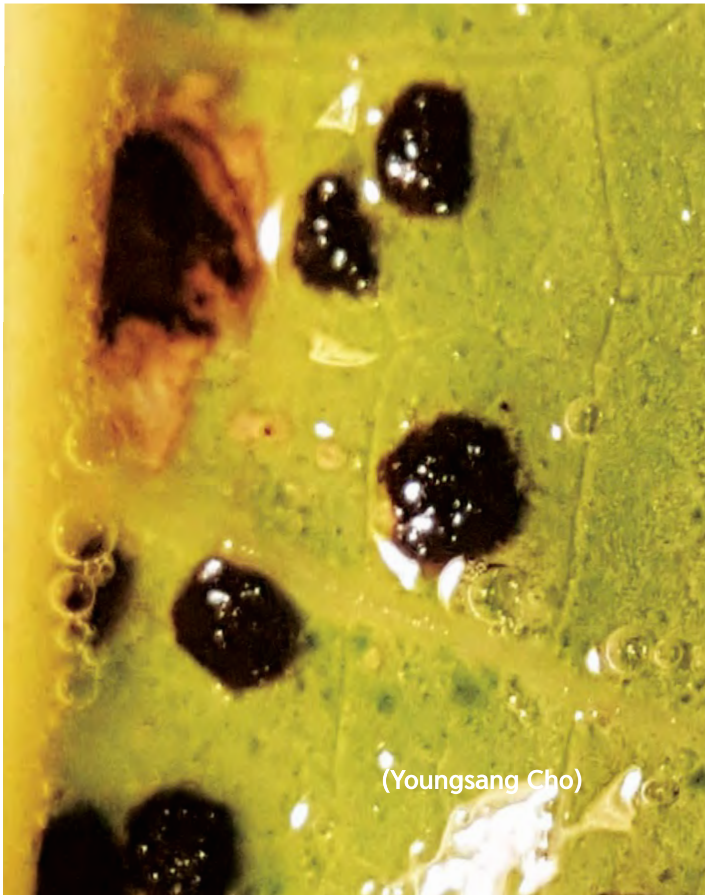
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



(Dr. Jose Liberato. wikipedia)



(Youngsang Cho)



(Youngsang Cho)

Bacterial canker

Xanthomonas campestris

Symptom description

This type of plant disease is caused by bacterial parasites that appear in citrus fruits, tomatoes, and tulips. All of them form ulcer-like lesions that resemble human abscesses. The pathogens of citrus canker disease are Xanthomonas campestris pv. citri, forming dark brown lesions on leaves, branches, and fruits. When the lesion is old, the central part becomes hollow and grayish-white.

Tomato bacterial canker is a viral disease known for a long time and has spread worldwide. Common pathogens are Corynebac-terium michiganense pv. michiganense. It occurs on stems, leaves, and fruits, and after diseased stems turn brown, cavities are formed. Leaves begin to wither from the edge, and canker lesions are formed on the fruit. When the damage is severe, there may be no harvest at all. The pathogen of tulip Bacterial canker disease is related to tomato bacterial canker, Corynebacterium flaccumfaciens pv. In addition, canker disease also occurs in sweet potatoes, and the pathogen is called Fusa-rium solani, but there are some problems with pathogenicity, so it is currently being reviewed. (Encyclopedia of Life Science)

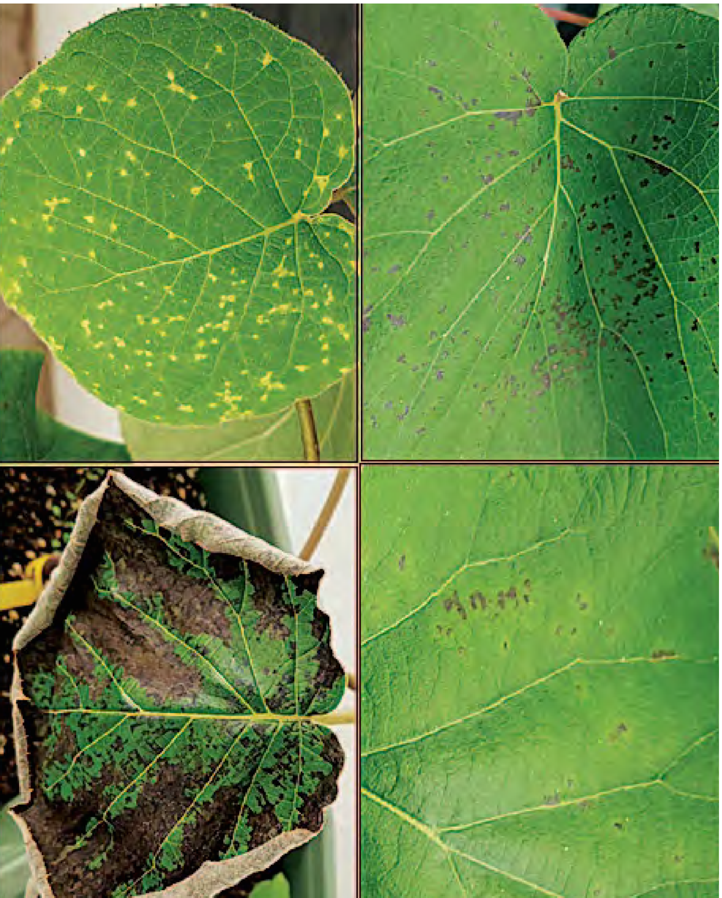
JADAM Natural Control Ratio

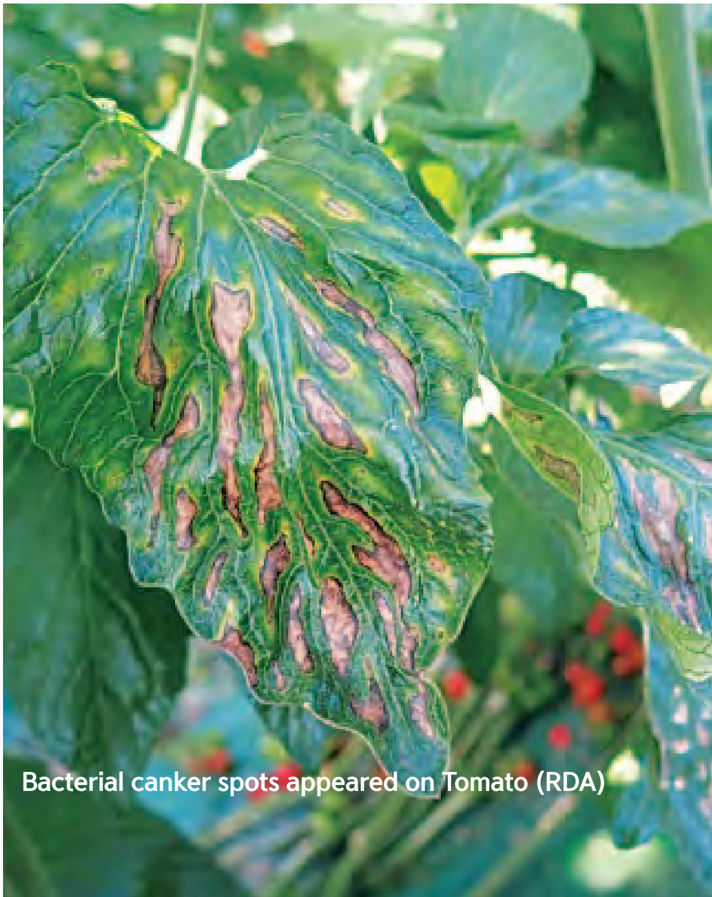
Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	Visible effect	3~4days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz





Bacterial canker spots appeared on Tomato (RDA)

Sclerotinia rot

Sclerotinia sclerotiorum

Symptom description

It occurs in fruits such as pears, apples, peaches, plums, and apricots. It occurs mainly on fruits but sometimes also occurs on branches and flowers. A brown spot pattern is formed on the surface of the fruit and becomes soft as it grows. On top of it, brownish-white or cream-colored spores form a round layered pattern.

After that, the diseased fruit is rotten and emits a bad smell. Pathogens are mainly in the form of hyphae or spores, wintering on diseased fruits or twigs and becoming the first transmission source in the following year. Ascospore can also transmit the disease.

Ascospore can first be dispersed by rainwater. Moreover, it can be propagated by the wind along with conidia. Pathogens may invade the host through pores or pistils, but mainly through wounds caused by insects. As a control method, diseased branches and fruits are removed early, and till the soil deeply before early spring to bury pathogens on the soil's surface or disinfect the soil with methyl bromide. (Doosan Encyclopedia)

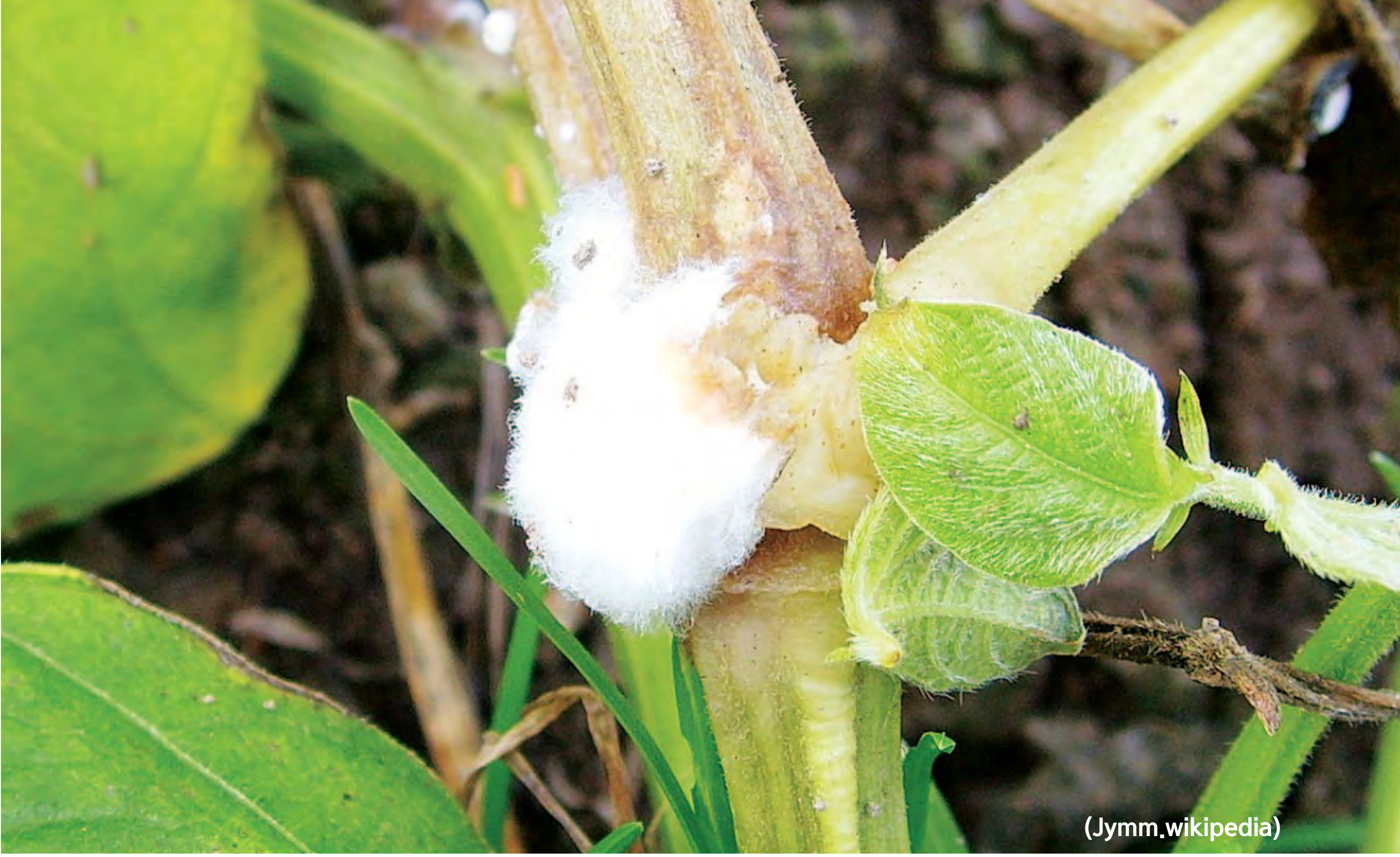
Refer to pages 25, 35~37

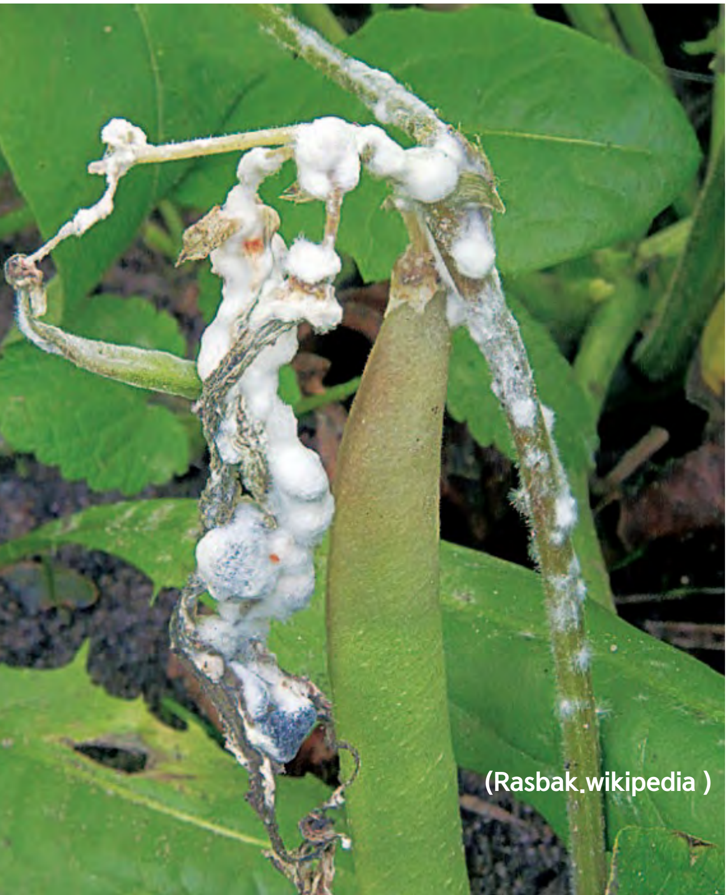
JADAM Natural Control Ratio

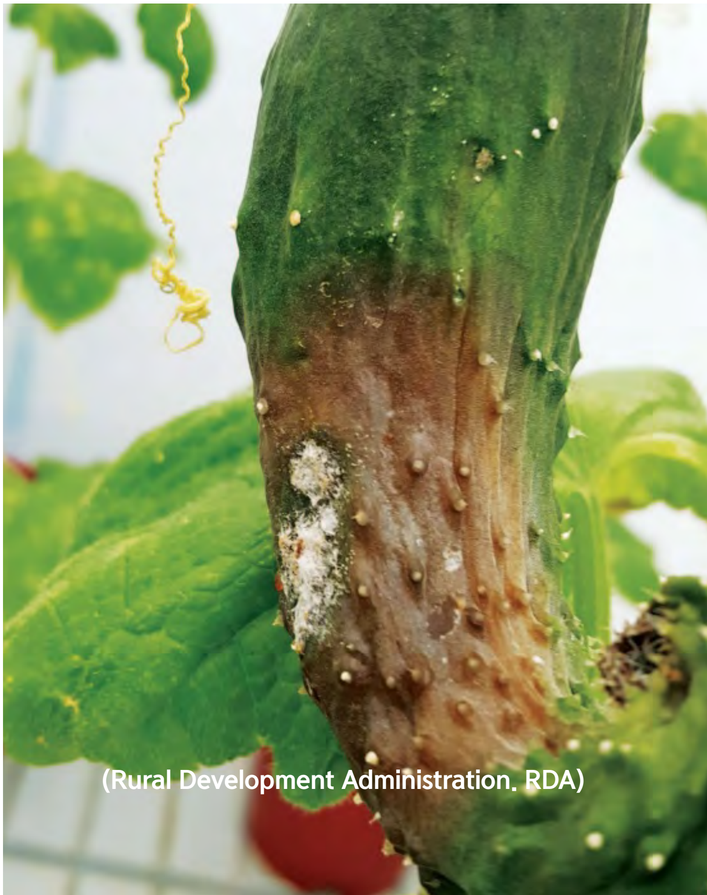
Standard (20L)	Prevention	Infestation	Emergency
JS		30ml	40ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


(Jymm.wikipedia)


(Rasbak.wikipedia)


(Rural Development Administration, RDA)

Sooty blotch

Capnophaeum fuliginodes

Symptom description

A disease that appears to be covered with soot on the front side of leaves, it is a parasitic soot disease in which pathogens directly injure trees. It usually occurs in poorly ventilated places or humid and shady places.

A large number of round blackish-brown lesions appear on the leaves' front surface from early summer as if covered with soot of 1~4mm in size. In autumn, H, T, Y-shaped black cells (ascistus) appear in the lesion center.

(Tree pest encyclopedia. Moon Seong-cheol)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	Visible effect	3~4days

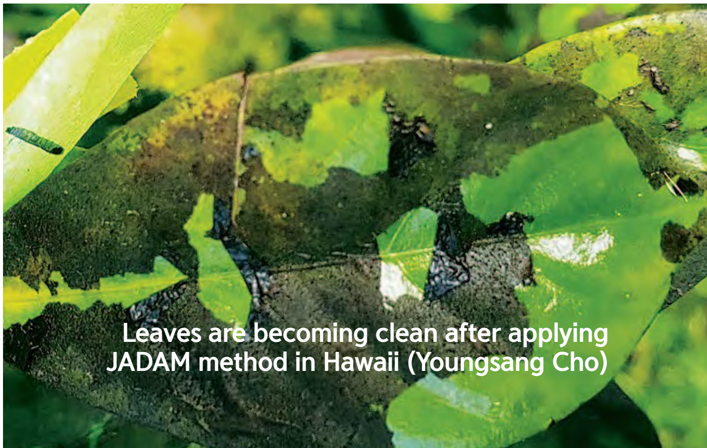
- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Encyclopedia of Tree disease)

(Youngsang Cho)

(Youngsang Cho)


Leaves are becoming clean after applying JADAM method in Hawaii (Youngsang Cho)

Smut

Ustilaginomycetes

Symptom description

It is a disease that occurs in crops such as rice, barley, corn, sugar cane, and grass, caused by fungal pathogens (smut, Ustilaginomycetes) belonging to Basidiomycetes. This causes a decrease in the productivity and quality of crops. It may occur in flowers, stems, leaves, and many more but mainly occurs in seeds, forming dark brown thick film spores that look like bumps.

Formed spores break easily and are transmitted by the wind to other host plants. Blotting germs generally overwinter in seeds, plant debris, and soil in the form of winter spores (winter spores, teliospore). Exposure to sunlight and sowing can avoid or reduce the outbreak.

(Tree pest encyclopedia. Moon Seong-cheol)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3~4days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(wikipedia)

(Thayne Tuason, wikipedia)

(wikipedia)

Downy mildew

Pseudoperonospora cubensis

Occurrence environment

If it occurs in the seedling, the damage is severe, but it is not a problem during the growing season. However, it begins to show symptoms from the lower leaves at a lower temperature with high humidity later in the growth period.

Pathogens overwinter in follicles of diseased plants, then invade the host again after germination, forming a large number of sporangia on the back of the leaf and quickly spread into the air. Pathogens invade through the leaves' pores, proliferate in the cell gap, and absorb nutrients from surrounding cells. Moisture and temperature have the most critical influence on the growth and spread of a pathogen. Spores germinate within 3 to 4 hours in low temperatures and humid conditions, infecting new crops within 4 to 5 days.

When the night temperature is 8~16℃, and the daytime temperature is less than 24℃, it becomes the optimal condition for outbreak, and it occurs severely if the period of dew on the leaves lasts until 10am for 3-4 days.

Symptom description

In the beginning, small amorphous lesions of light yellow color are formed on a leaf, and a large amount of white fungus is formed on the back of the leaf. When it occurs during the seedling period, the leaves fall off easily, and the entire seedling dies. In the late growth period, infected leaves do not fall off, but small lesions are combined so that the whole leaf turns yellow-green to yellowish-brown and dies.

(National Crop Pest Management System/NCPMS)

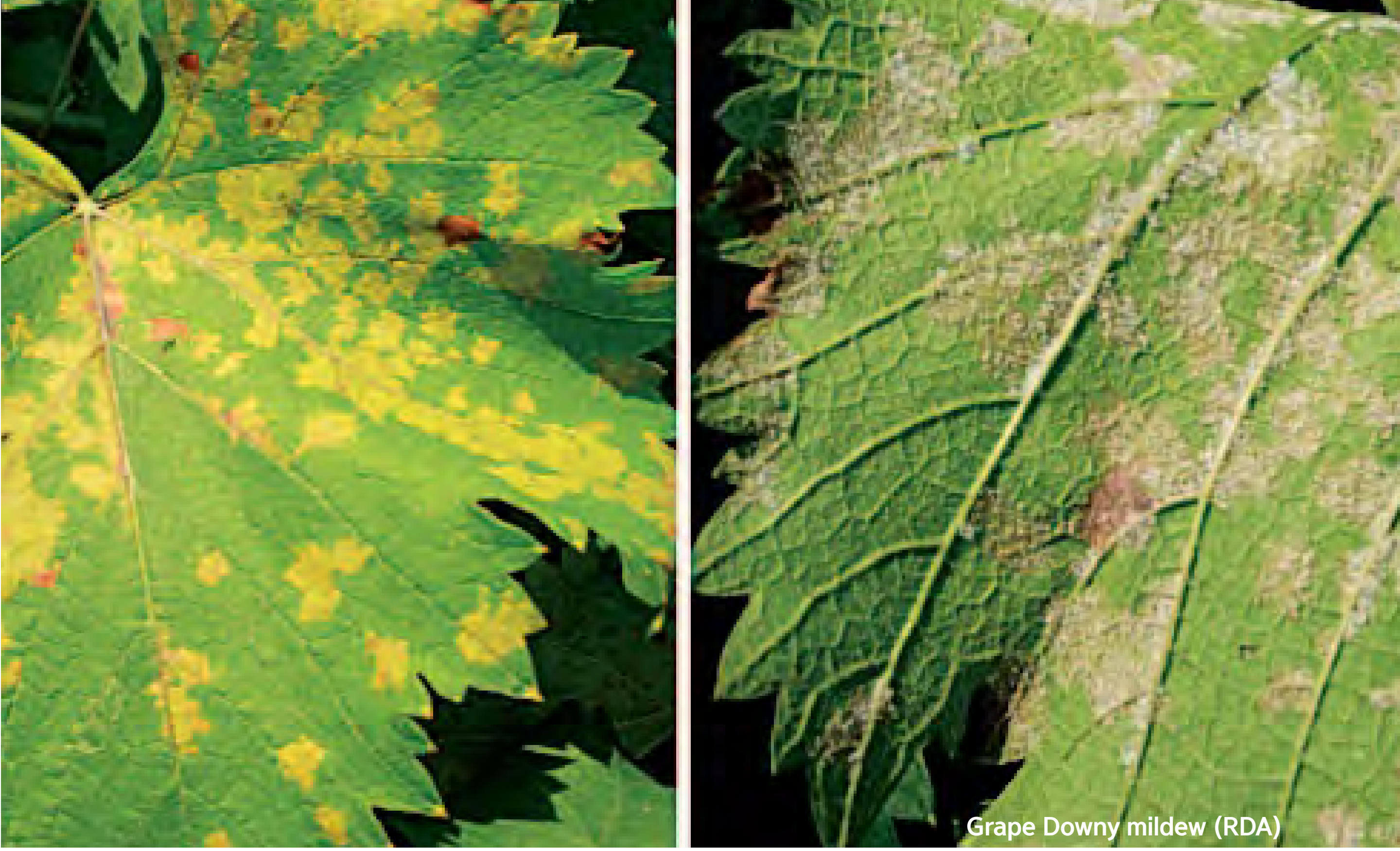
JADAM Natural Control Ratio

Refer to pages 25, 35~37

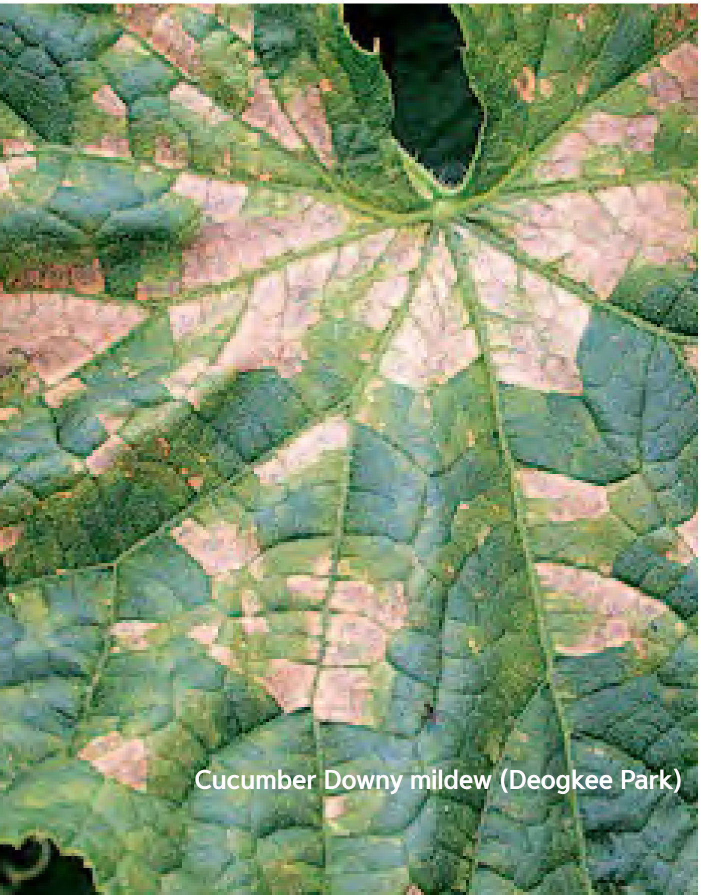
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		30ml	40ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	2~3days	**Visible effect**	1day

- Although the JADAM solution is effective, it is difficult to completely control it.
- This disease spreads very quickly when it rains or is wet, so if it occurs, the control interval should be 1 to 2 days.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.

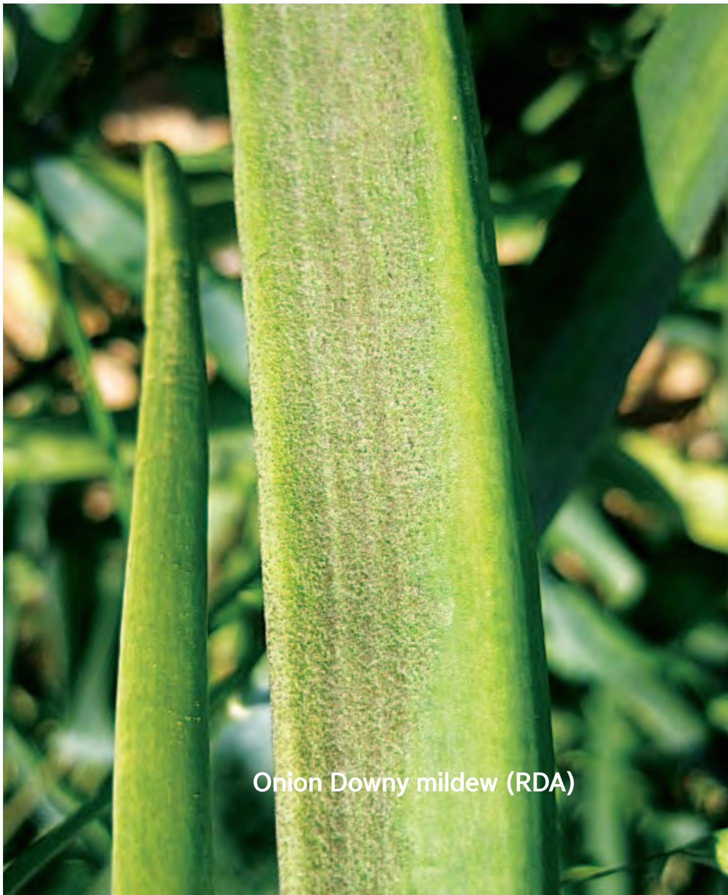
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Grape Downy mildew (RDA)



Cucumber Downy mildew (Deogkee Park)



Onion Downy mildew (RDA)

Rust

Puccinia jogashimensis

Occurrence environment

It starts in mid-July and increases until November in subtropic regions and overwinters with crops. It mainly affects old leaves that have fallen rather than new ones. In severe cases, leaves become yellow or die, leading to premature aging.

Symptom description

Small yellow spots on the front and back of leaves appear and petioles turn yellow-red in severe cases. The lesions are raised on the leaves front and back forming an orange-shaped pustule, called an uredini, a large number of spores are contained in them.

(National Crop Pest Management System/NCPMS)

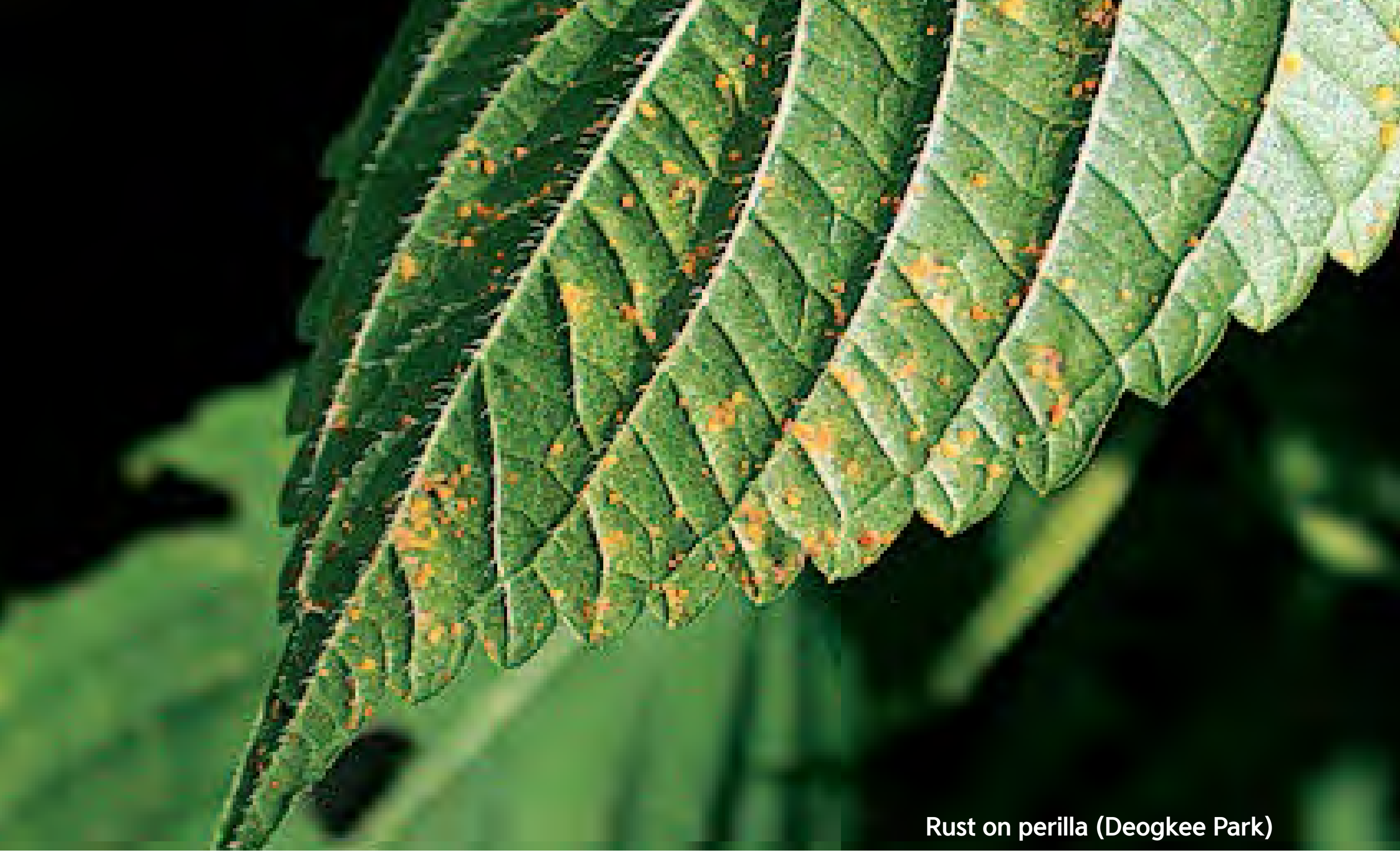
Refer to pages 25, 35~37

JADAM Natural Control Ratio

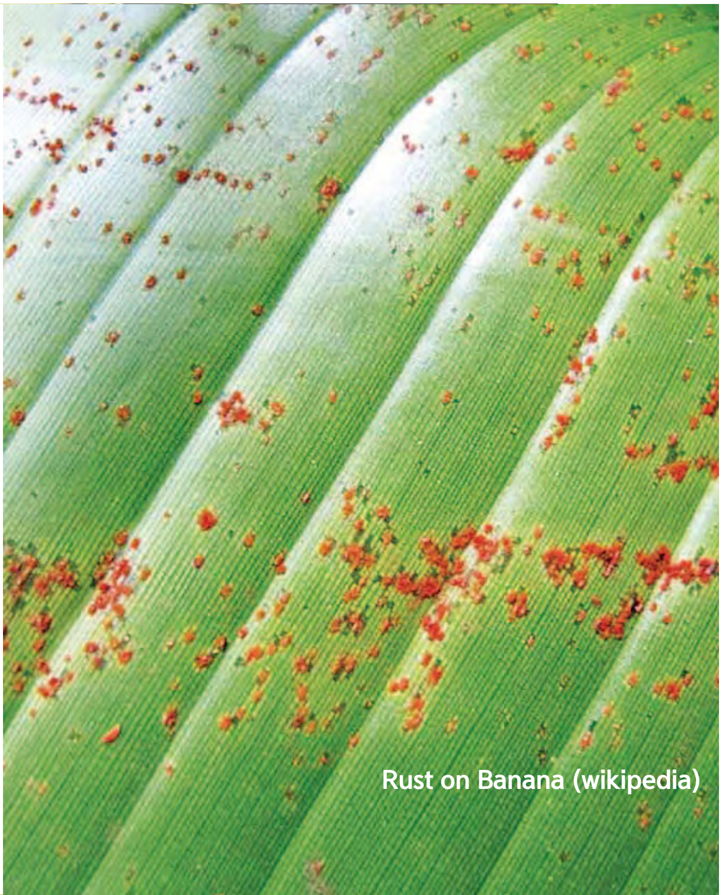
Standard (20L)	Prevention	Infestation	Emergency
JS		30ml	40ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			40g
Fine soil			60g
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

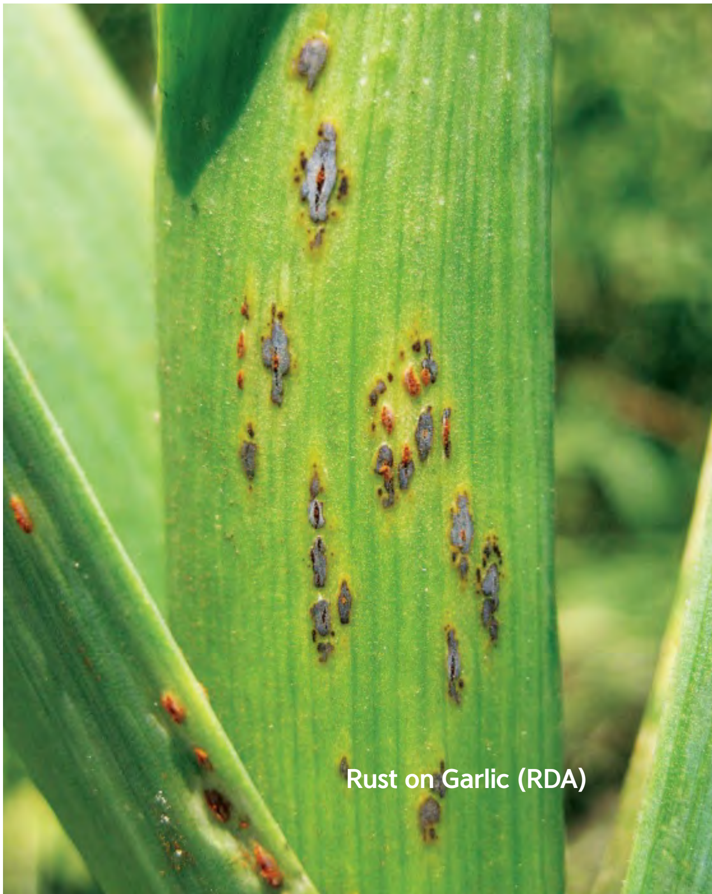
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Rust on perilla (Deogkee Park)



Rust on Banana (wikipedia)



Rust on Garlic (RDA)

Scab

Elsinoe fawcettii

Occurrence environment

This pathogen passes through the winter in the form of hyphae in the lesions of branches or leaves, and when the lesions are wet at 15 ℃ for 2 days, spores begin to form, its growth will speed up and show the first symptoms within 2.5 days at 25℃. No disease occurs above 35 ℃.

After spores are formed, pathogens can invade even if the plant's surface is only wet for about 3 hours. In particular, leaf lesions are important as a source of winter transmission in the field, and conidia are formed on the lesions to become the primary source of transmission.

Spores formed in the lesion are mixed in raindrops, scattered into the air, and travel a long distance. Although fusiform spores do not germinate directly and cause disease, they are mainly produced in the morning when dew is formed and are propagated by the wind.

Leaves are most susceptible from germination to medium growth, and disease does not occur at all when the leaves grow completely and begin to harden. Fruits are most susceptible 1~2 months after falling, but the disease can even occur after 3~4 months if the conditions are optimized for growth.

Symptom description

The symptoms begin to appear 3 days after the invasion of pathogens in the leaves. The initial symptoms are small spots like yellowish brown fly dung with yellow color around them.

In severe cases, leaves or fruits become deformed, and in shoots, leaves may die. Symptoms vary depending on the growth status of leaves or fruits. After the initial infection (up to a quarter of the growth in the case of leaves and about 0.5 to 1 cm in the case of fruits), they become protuberances, and later will become swollen or crusty terrain. Also, protruding or scab-like lesions also change into swelling lesions as the fruit grows.

(National Crop Pest Management System/NCPMS)

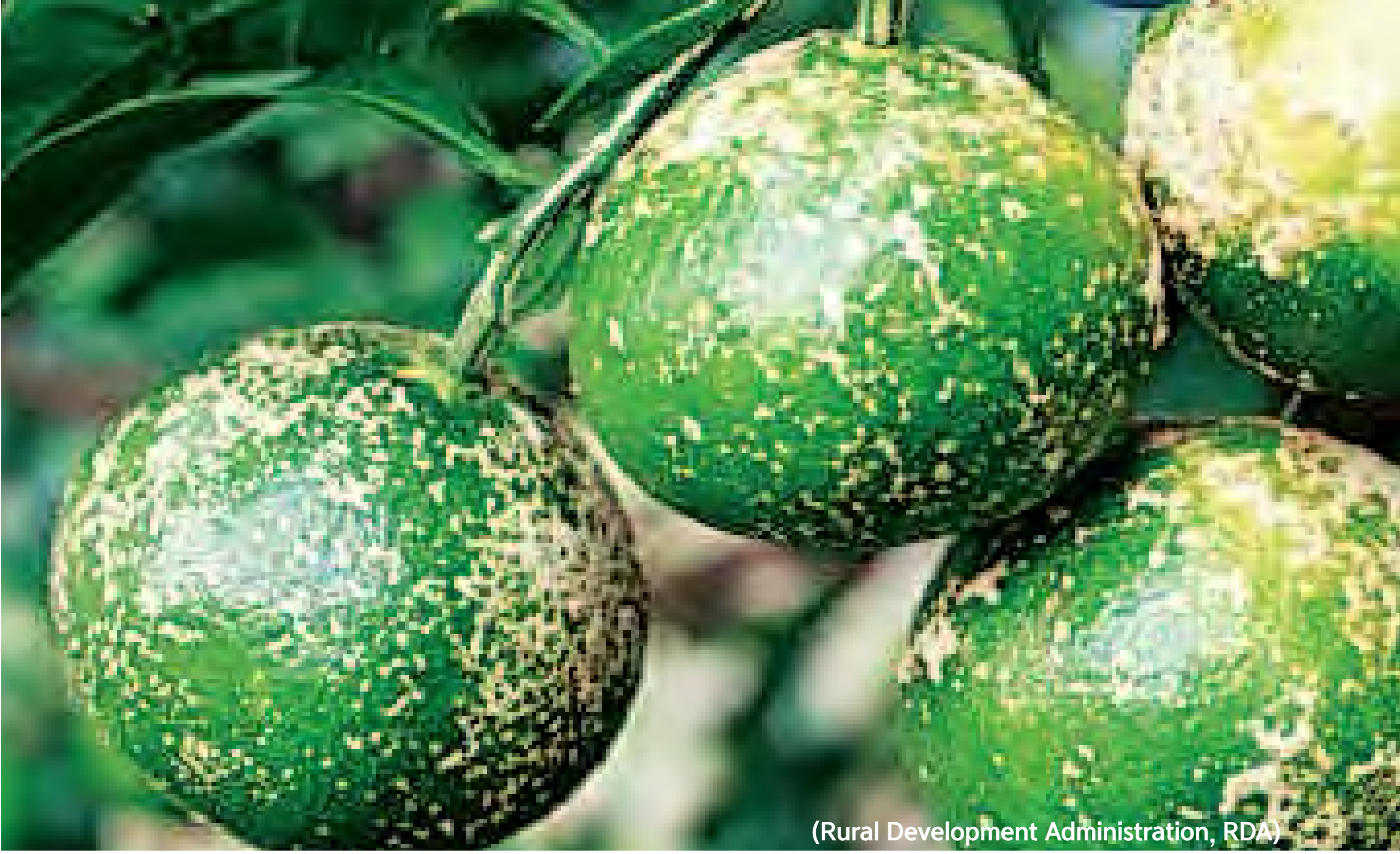
JADAM Natural Control Ratio

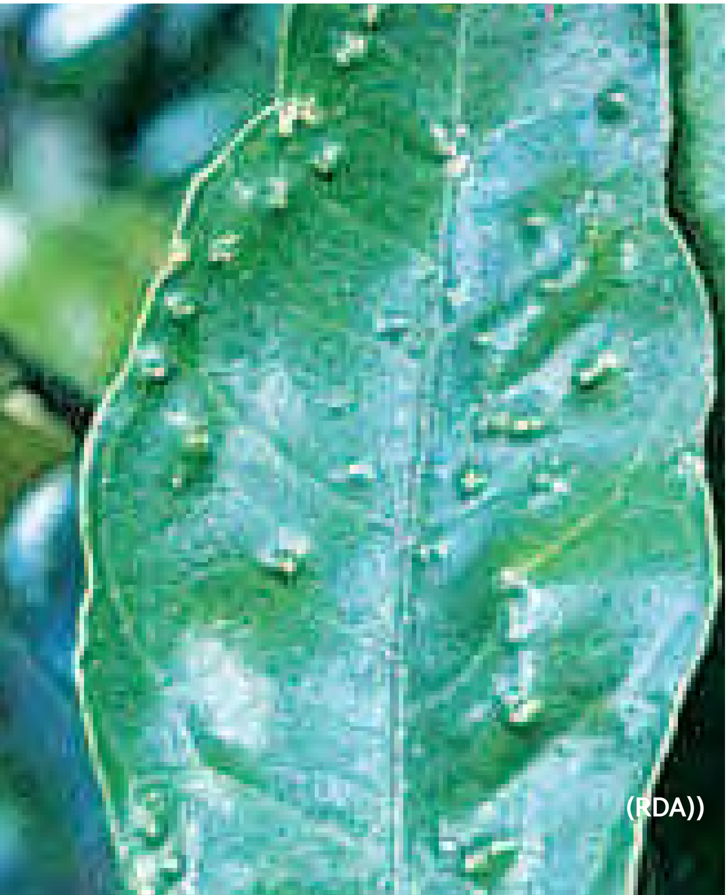
Refer to pages 25, 35~37

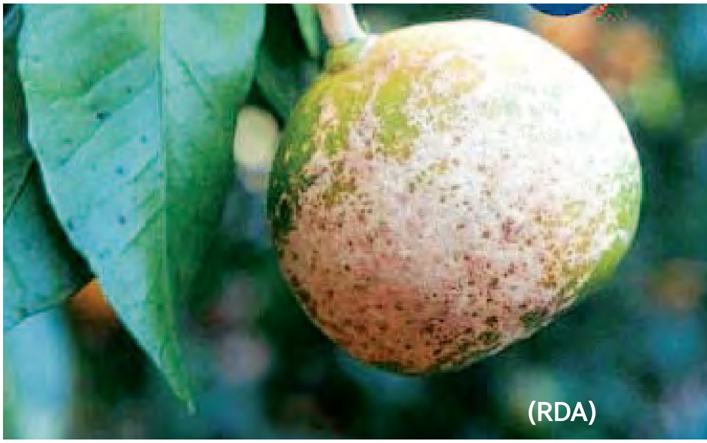
Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	Visible effect	7days

- Although the JADAM solution is effective, it is difficult to completely control it.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


(Rural Development Administration, RDA)


(RDA))


(RDA)

(RDA))

Blast

Magneporthe oryzae

Occurrence environment

This pathogen survives through winter in seeds or diseased plant remnants and becomes the primary source of transmission. In the second transmission, conidia formed on the lesion are blown by the wind and spread to the air. Leaf blast disease forms lesions on leaves, even in seedlings. It mainly occurs at the end of June.

Generally, blast infection occurs before and after the heading stage, and leaf blast lesions formed on the upper leaves are thought to be the primary transmission source. Blast disease occurs severely during the growing season and when the summer season's temperature is low, especially during the cold transition season. The occurrence becomes severe if high nitrogen fertilizer is used.

Symptom description

It forms a lesion on leaves, spike, neck of the panicle, nodes, and rice grains. A fusiform lesion is formed on the leaves, and in the case of a chronic infection, the edges appear red, but in the case of an acute type, gray-colored mild mold (conidia) covers the lesion's surface.

The panicle's neck and branch of the panicle dry to a light brown color, and when there is excess moisture, a gray mold grows on the surface. A dark brown disease pattern is formed on the joints causing weak tissue, and when it is humid, the surface is covered with gray mold. If the leaf blast disease is severe the whole plant leaves become a light red and does not grow and the spike with the blast becomes chaff.

(National Crop Pest Management System/NCPMS)

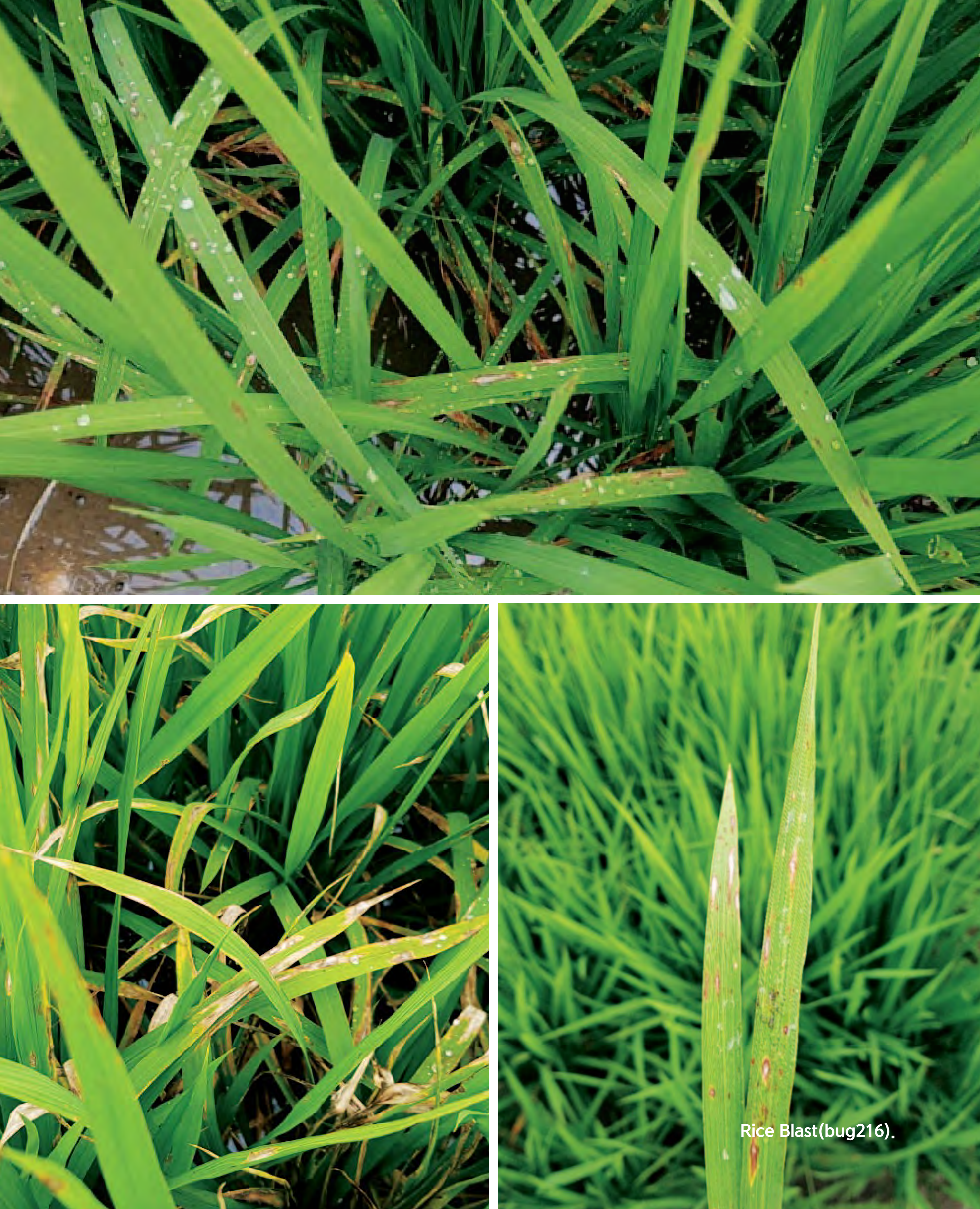
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3day

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Rice Blast(bug216).

Mosaic virus

Occurrence environment

Cytomegalovirus (CMV) is widely distributed all over the world, especially in temperate regions. (Potato virus X (PVX) is also transmitted through fluid transmission or contact. Contact transmission is transmitted not only through contact with leaves or stems but also through contact with roots. Aphids do not mediate PVX, but it is also transmitted by insects and fungi (Synchyrium endoticum).

Hosts that can be infected in nature include peppers, tobacco, potatoes, and tomatoes. TMV Tobacco mosaic virus (TMV) is not transmitted by aphids but is transmitted by contact. The outbreak is expected if the host of natural infection is the source of transmission. The virus has a wide host range, so it attacks more than 200 species in 22 families, mainly dicotyledonous plants such as alanaceae, asteraceae, and legumes. But the most damaged crops are tomatoes, pepper, and tobacco.

Symptom description

Four types of viruses cause it. CMV symptoms cause mosaic with yellowing and irregularities. A new leaf from a diseased tree has a narrow leaf width, atrophy, becomes like a fern leaf, and the entire tree becomes dwarf. A typical PVX symptom is a pale green mosaic lesion between the leaf veins.

As the disease progresses, wrinkles appear on the leaf surface, weakening the plant and atrophying the leaf. Symptoms caused by PepMoV include green bands in the veins and macular mosaicism. Also, the symptom of leaf vein transparency appears on the lower side of the leaf, and it progresses upward and rises.

Symptoms caused by TMV are mosaic, and some new leaves turn yellow, but in general, symptoms do not appear much during periods of active growth, and brown spots may appear on leaves, petioles, and stems. In severe cases, leaves and flower buds fall, and twigs may die.

(National Crop Pest Management System/NCPMS)

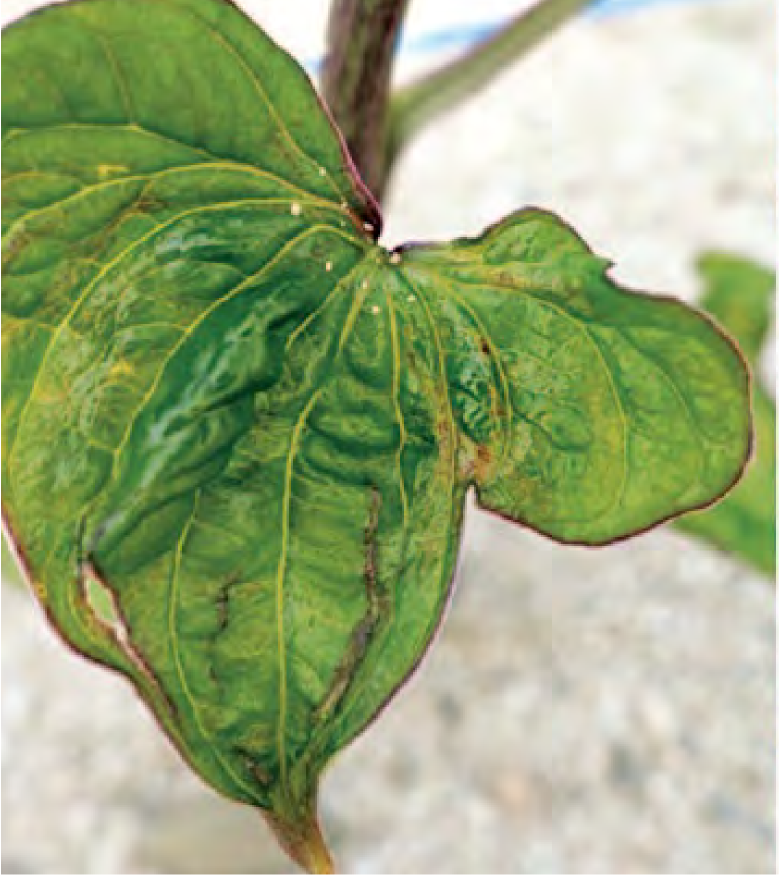
JADAM Natural Control Ratio

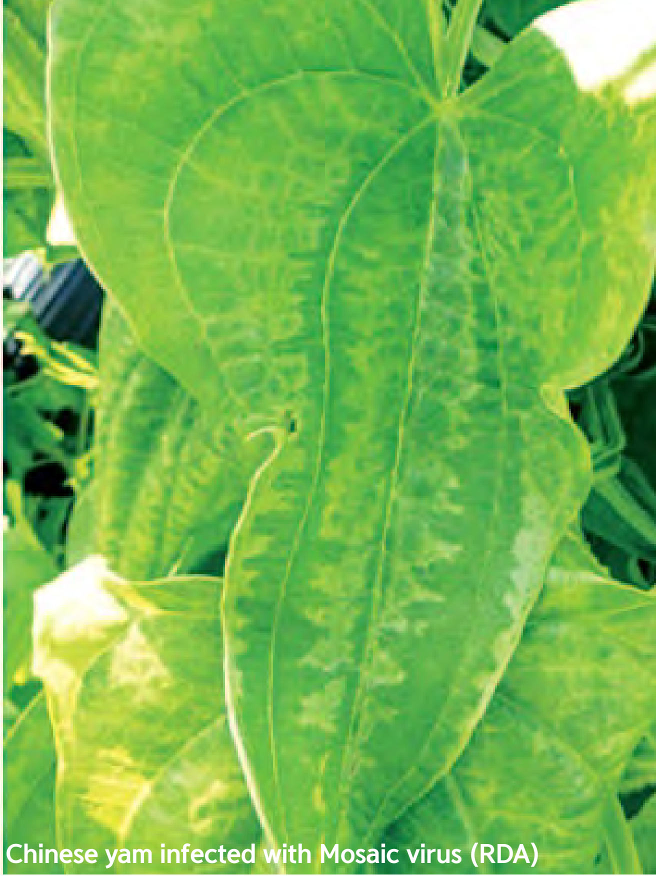
Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	50ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	Visible effect	5days

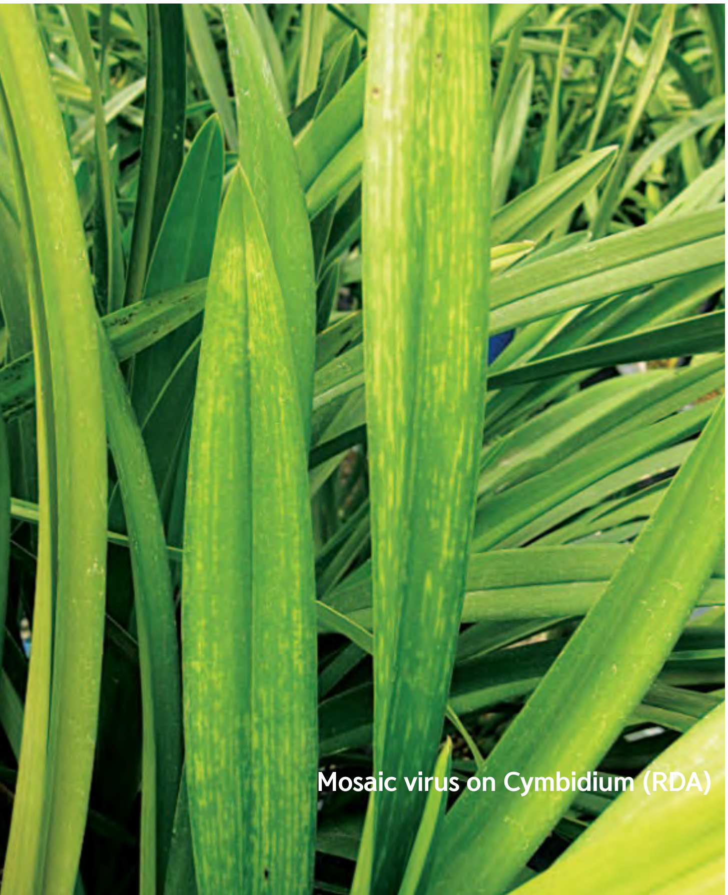
- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

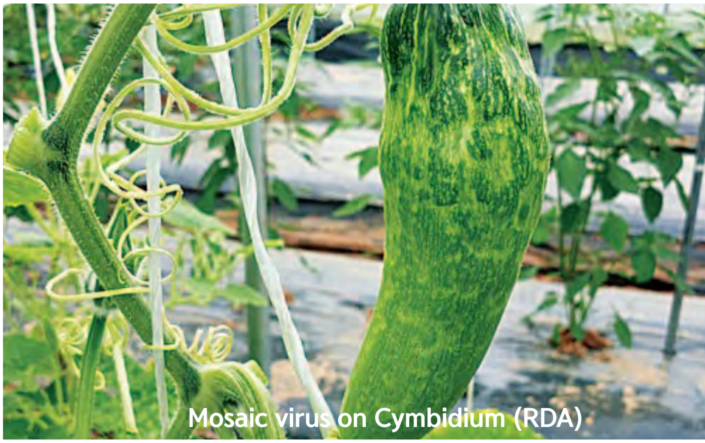




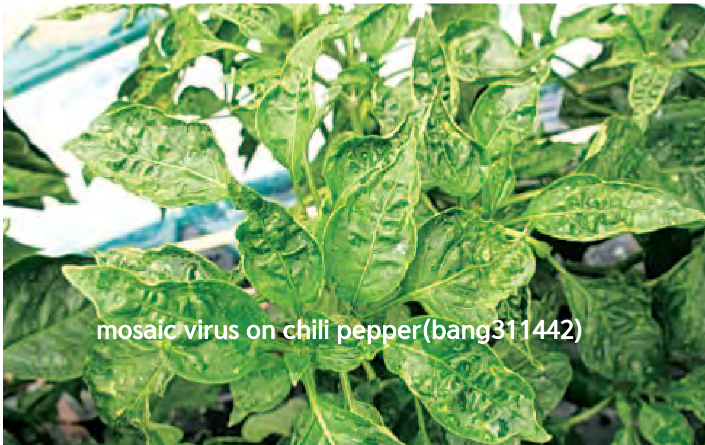
Chinese yam infected with Mosaic virus (RDA)



Mosaic virus on Cymbidium (RDA)



Mosaic virus on Cymbidium (RDA)



mosaic virus on chili pepper(bang311442)

Bacterial soft rot

Erwinia carotovora subsp

Occurrence environment

This Pathogen is from the remnant of diseased plants or exists in the soil and becomes the primary transmission source. It survives the winter in the pupae of flies.

It usually invades at the same time as insect larvae invade the host and may also invade through normal wounds. The attacking bacteria secrete pectinase to decompose pectin in the middle lobe of the cell wall, decompose cell wall fibrin with fibrinolytic enzyme, and move between cells to destroy adjacent cells, resulting in softness symptoms in fruit.

Symptom description

It occurs mainly in fruit. Infection begins mainly in the fruit's wounded area, and the diseased fruit softens and rots, and turns grayish-white. It emits a severe odor. It also occurs on leaves or stems, but it is not a big problem. It can also occur on roots and petioles. Initially, it appears as a gray-white water bed on the root head, and when it progresses, the inside turns pale brown to soften and rot and smells terrible. The above-ground part shows wilting symptoms, and the petiole becomes soft and rotted and smells bad. A severely infected tree will decay as a whole.

(National Crop Pest Management System/NCPMS)

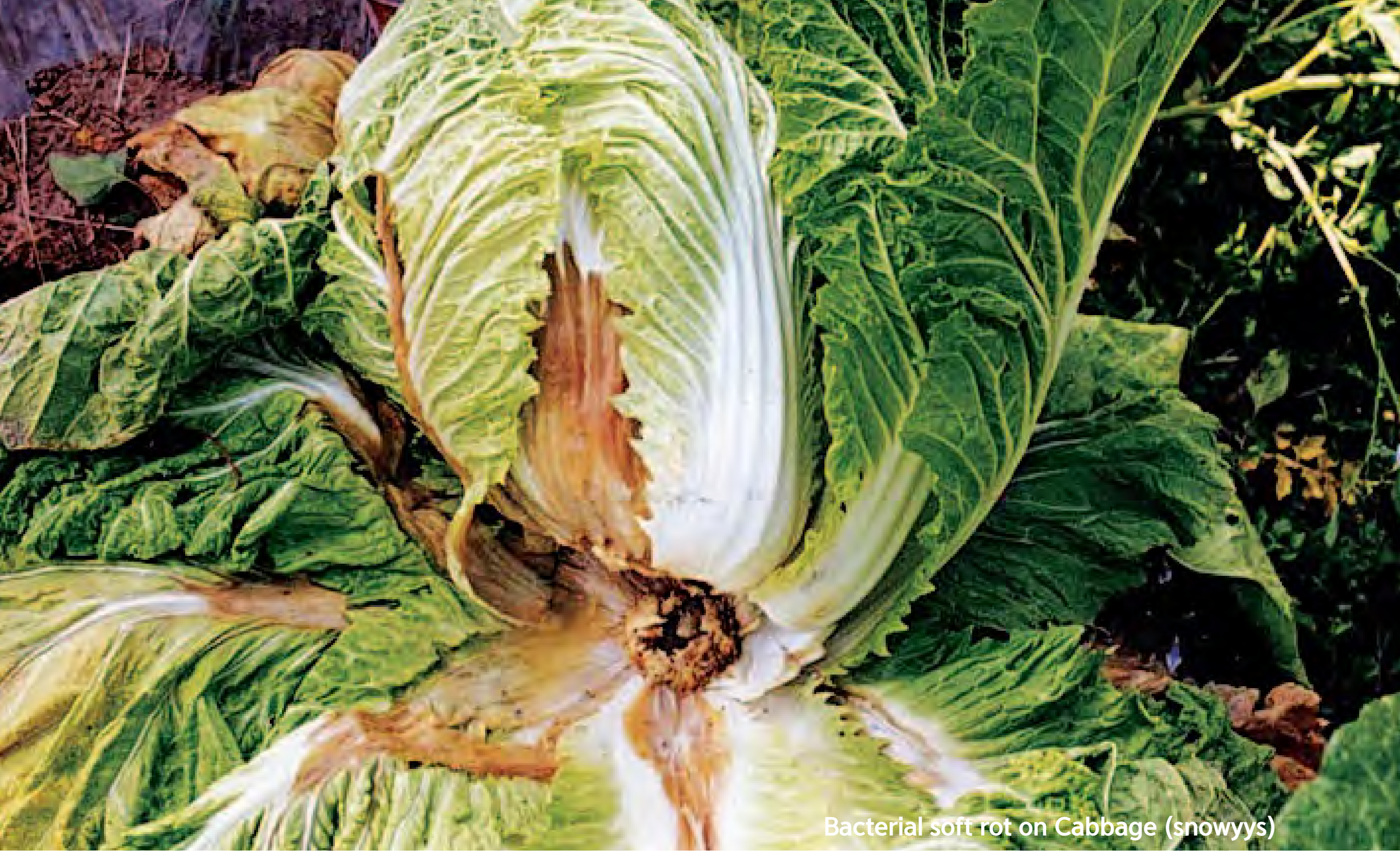
JADAM Natural Control Ratio

Refer to pages 25, 35~37

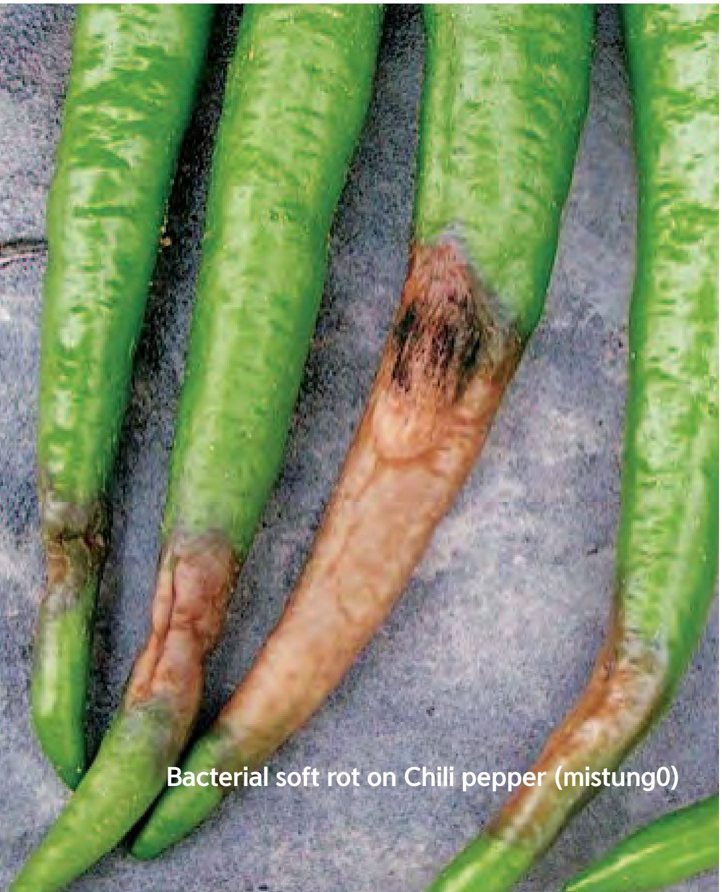
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		40ml	60ml
JWA	200ml	400ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3~4days

- JADAM solution effectively controls this disease.
- Frequent irrigation of JMS before planting crops and frequent use of JMS during cultivation can prevent disease occurrence in advance. Diseases can be prevented when a lot of various microorganisms live in the soil.
- Be careful of concentration damage when using JS.

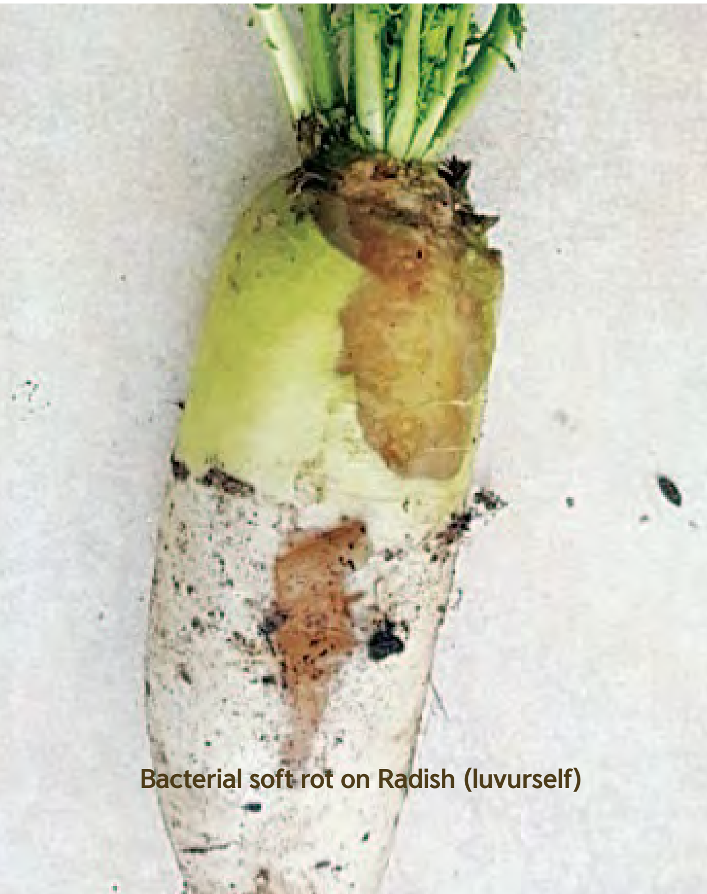
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Bacterial soft rot on Cabbage (snowyys)



Bacterial soft rot on Chili pepper (mistung0)



Bacterial soft rot on Radish (luvurself)

Valsa canker

Valsa ceratosperma

Occurrence environment

Ascospore and pycnospore formed on the lesion are the sources of transmission, and formation is very low in Korea; its primary source of transmission is pycnospore. Pycnospore formed in pycnidium move along with rainwater and germinate in apple trees' wounds to infect.

The most easily invaded places for pathogens are fruit tree stems, pruned areas, nectar glands, branches of large limbs, and injured places, it infects through dead tissues. Infection can occur at any time of the year with only spores, and the most common time for infection is from December to April. It takes quite a long time from infection to infestation, ranging from several months to 3 years. Once it infests, the lesion develops year-round and progresses fastest from spring to early summer, temporarily stagnates in summer, but continues again in autumn and progression of the lesion continues at a slow pace even in winter.

This disease occurs in Korea, Japan, and China. The first known in Korea was in 1919, just after commercial production of apples began in Korea. After that, there was not much of a problem until the mid-1960s, but damage gradually increased from the late 1960s, to the early 1970s, it became a severe threat to Korea's apple industry.

Symptom description

It occurs in the main trunk or branches. At first, the bark turns brown, swells, peels easily, and emits an alcohol odor. When the diseased area is dry, it loses moisture and becomes depressed, and small black dots (pycnidium) are formed on the surface. It occurs in spring on small branches and dies during high temperatures in summer, but it is challenging to distinguish it from white-rot symptoms.
(National Crop Pest Management System/NCPMS)

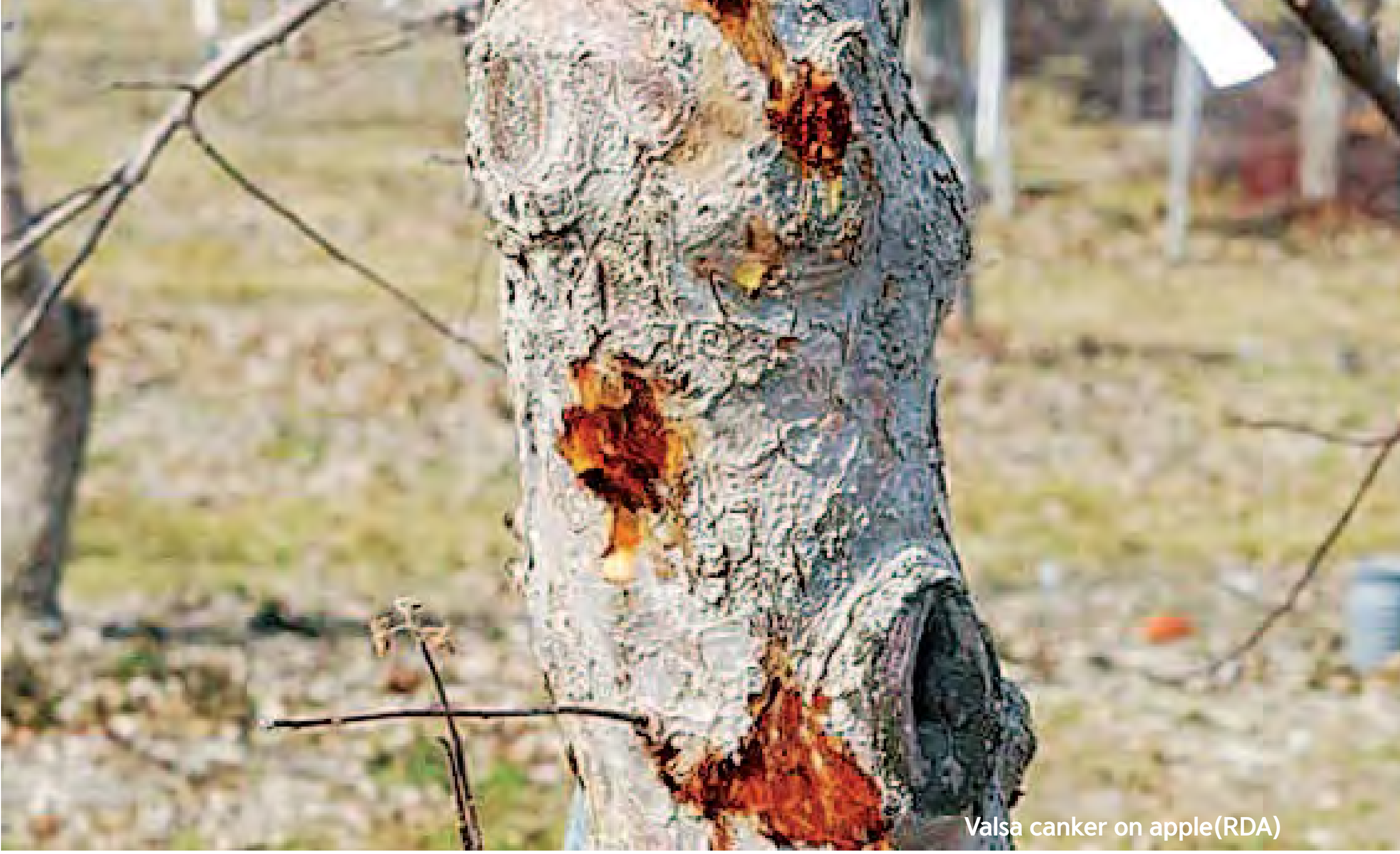
Refer to pages 25, 35~37

JADAM Natural Control Ratio

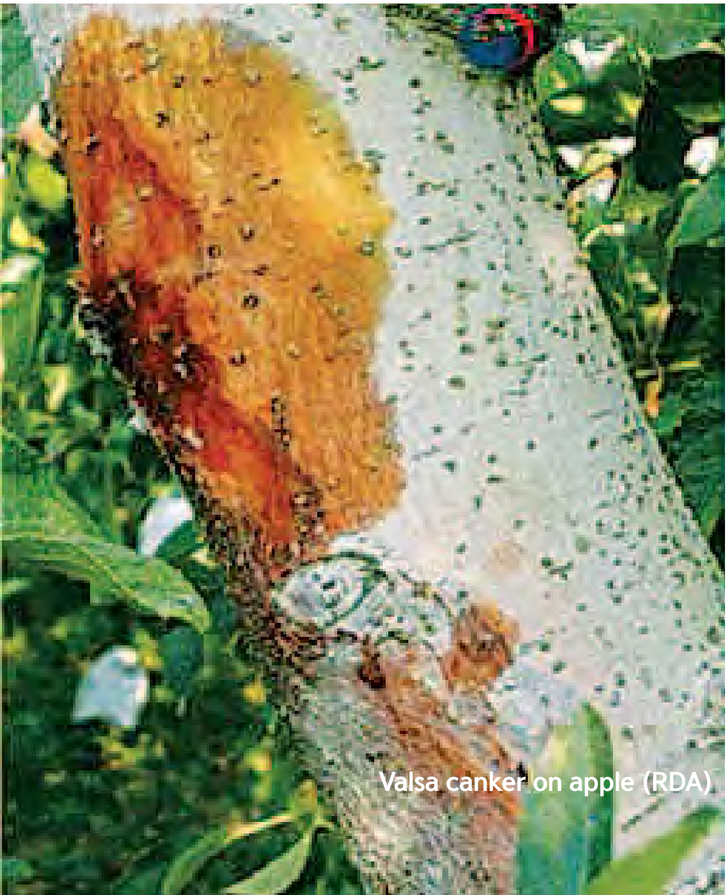
Standard (20L)	Prevention	Infestation	Emergency
JS	200m	40ml	
JWA	400ml	400ml	
JHS	400ml		
JMS			
NaOH	60g		
Fine soil	60g	60g	
Control interval	10days	Visible effect	5days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.

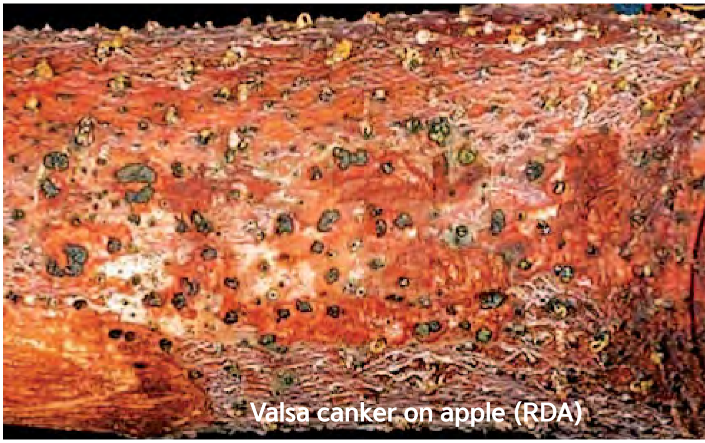
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



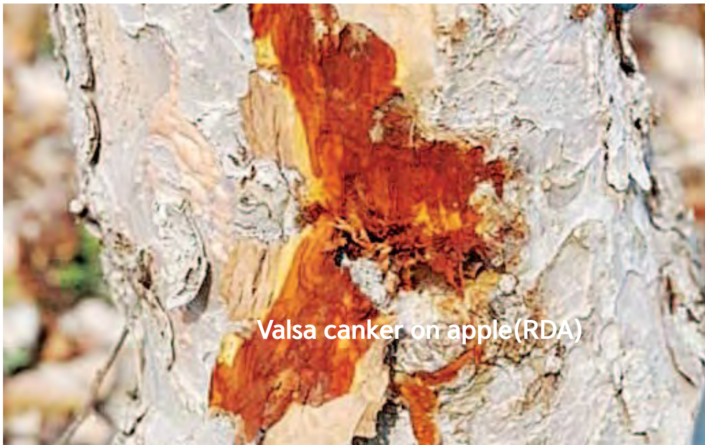
Valsa canker on apple(RDA)



Valsa canker on apple (RDA)



Valsa canker on apple (RDA)



Valsa canker on apple(RDA)

Clubroot

Plasmodiophora brassicae

Occurrence environment

The dormant spores of this pathogen present in the soil can survive for many years and are transmitted by rainwater, irrigation water, soil, wind, animals, and agricultural equipment. It is easy to develop in too wet fields with a soil humidity of 80% or more, and there are many diseases in acidic soils with a temperature of 20~25℃ and a soil acidity of 6.0 or less. Usually, it does not occur in fields with soil acidity of 7.2 or more or soil moisture of 45% or less. Pathogens attack not only radish but also other cruciferous vegetable crops, causing Clubroot disease.

Symptom description

The above-ground part of the infected tree has sluggish growth compared to a healthy tree, and the symptoms of wilt gradually worsen as the disease progresses. Trees infected at the beginning of growth have whole leaves turn blue, and trees that are infected after the mid-growth period mainly show signs of wilting on only the lower leaves or not showing signs of wilting.

The root of a diseased tree is abnormally hypertrophy, and several small or large irregular lumps are formed on the root. Moreover, the shape of the formed lump looks different depending on the plant's growth stage and the degree of infection. In the late growth stage, bacteria or other fungi invade into the lump's wound, causing the roots to rot. (National Crop Pest Management System/NCPMS)

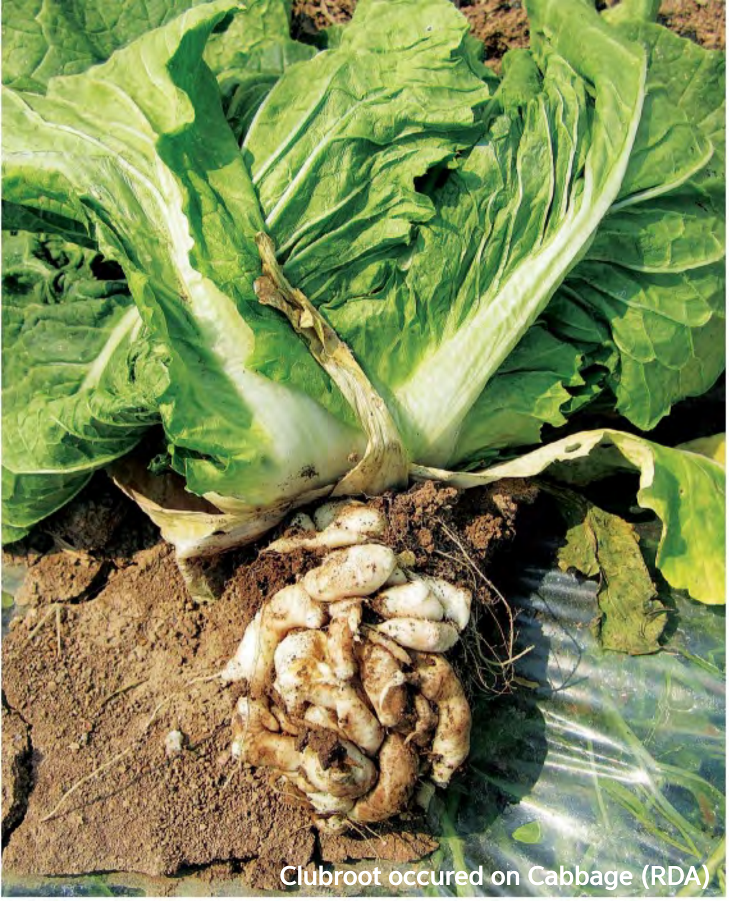
JADAM Natural Control Ratio

Refer to pages 25, 35~37

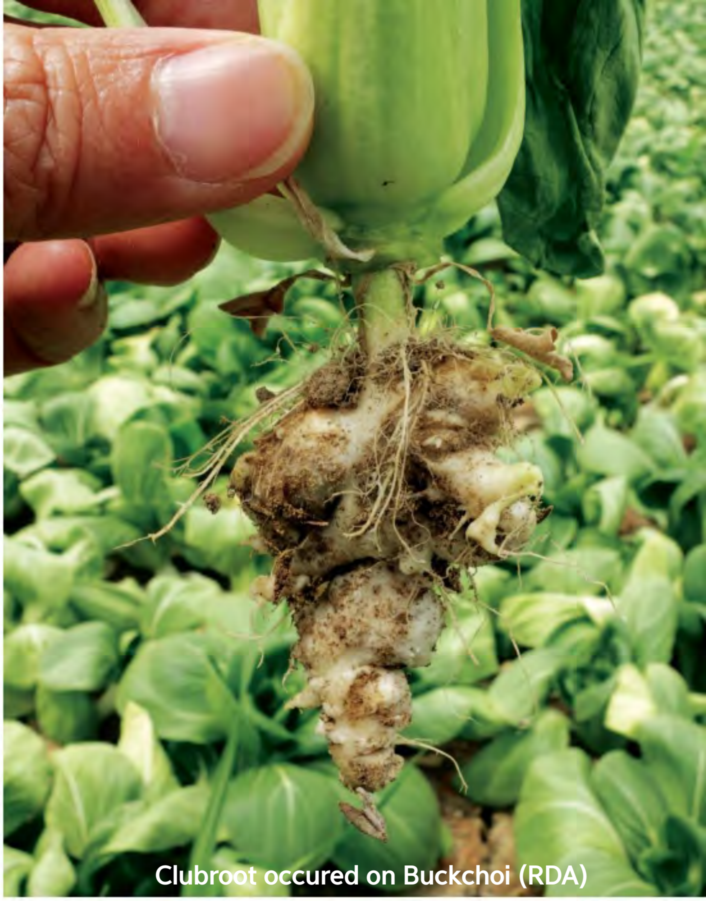
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA			
JHS			
JMS	2000ml	2000ml	
NaOH			
Fine soil			
Control interval	7days	Visible effect	5days

- Frequent irrigation of JMS before planting crops and frequent use of JMS during cultivation can prevent disease occurrence in advance. Diseases can be prevented when a lot of various microorganisms live in the soil.

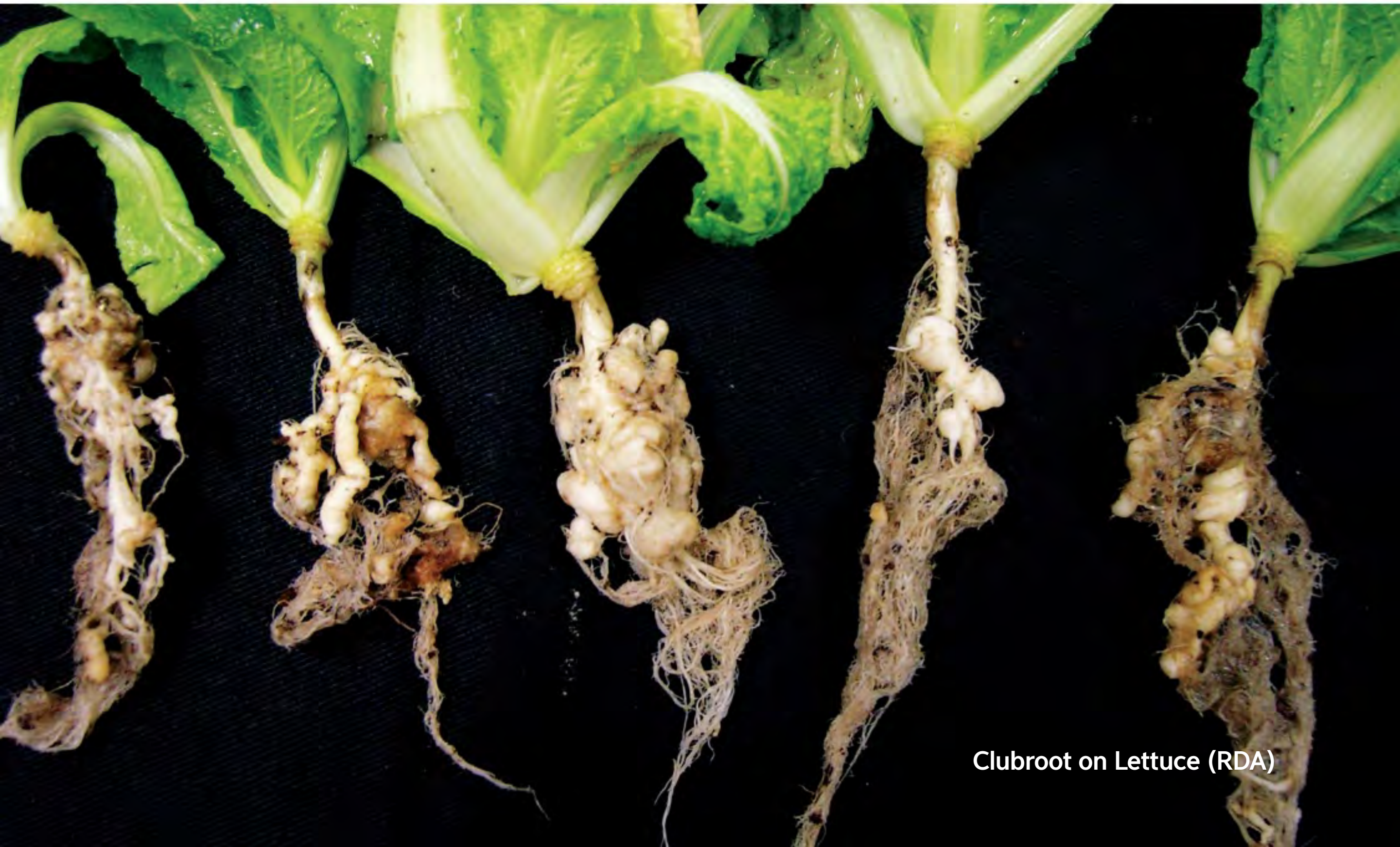
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Clubroot occured on Cabbage (RDA)



Clubroot occured on Buckchoi (RDA)



Clubroot on Lettuce (RDA)

Bacterial spot

Xanthomonas campestris

Occurrence environment

These pathogens live through winter in the remnants and seeds of diseased plants and becomes the primary transmission source. The pathogens are mainly caused by rain, wind, agricultural equipment, and pathogens invade through pores and wounds.

Symptom description

The leaves appear as small grayish-brown spots at first, after progressing, the center turns to white, and the edges of the lesions take on a dark brown color. A yellow rim is formed around the lesion.

In severe cases, the entire leaf turns brown and falls off. Brown round spots are formed on petioles and stems, and after awhile are slightly enlarged to dark brown irregular shapes. On the fruit of bell peppers, it appears as a brown to dark brown spots.

(National Crop Pest Management System/NCPMS)

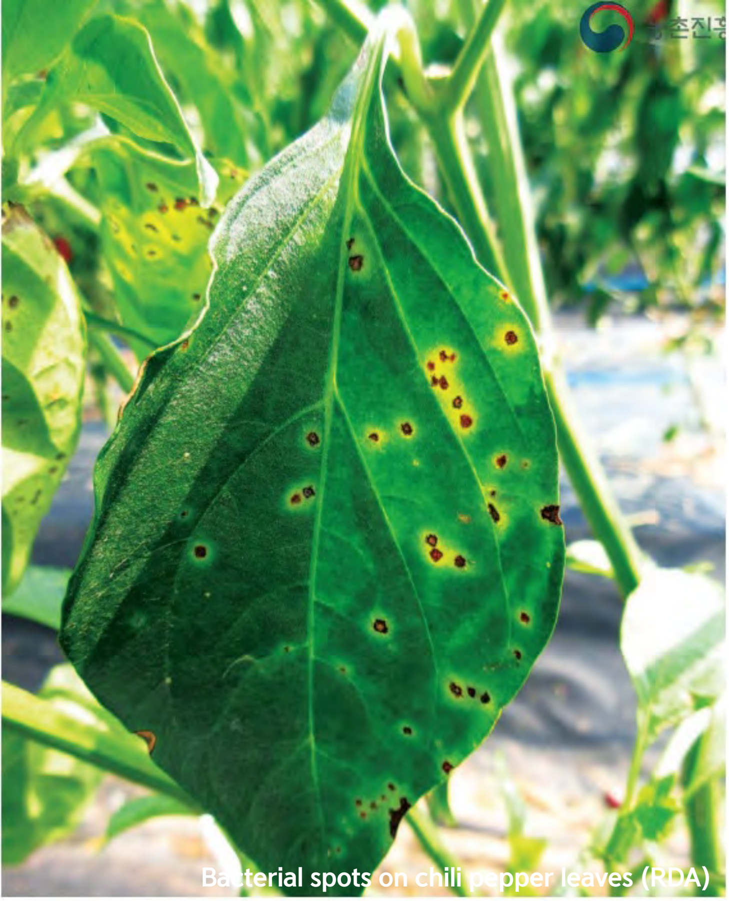
Refer to pages 25, 35~37

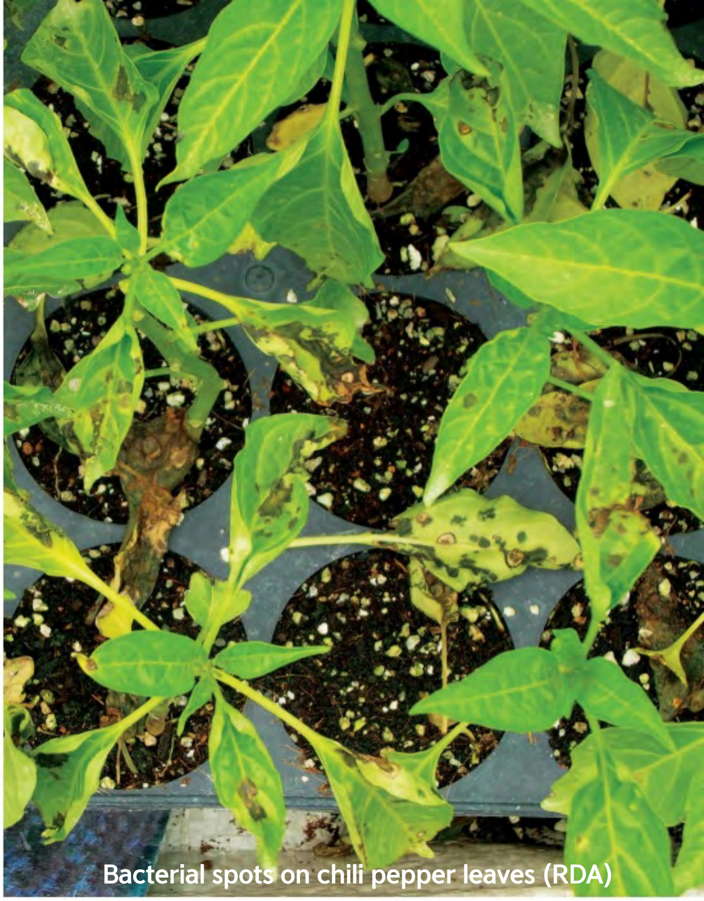
JADAM Natural Control Ratio

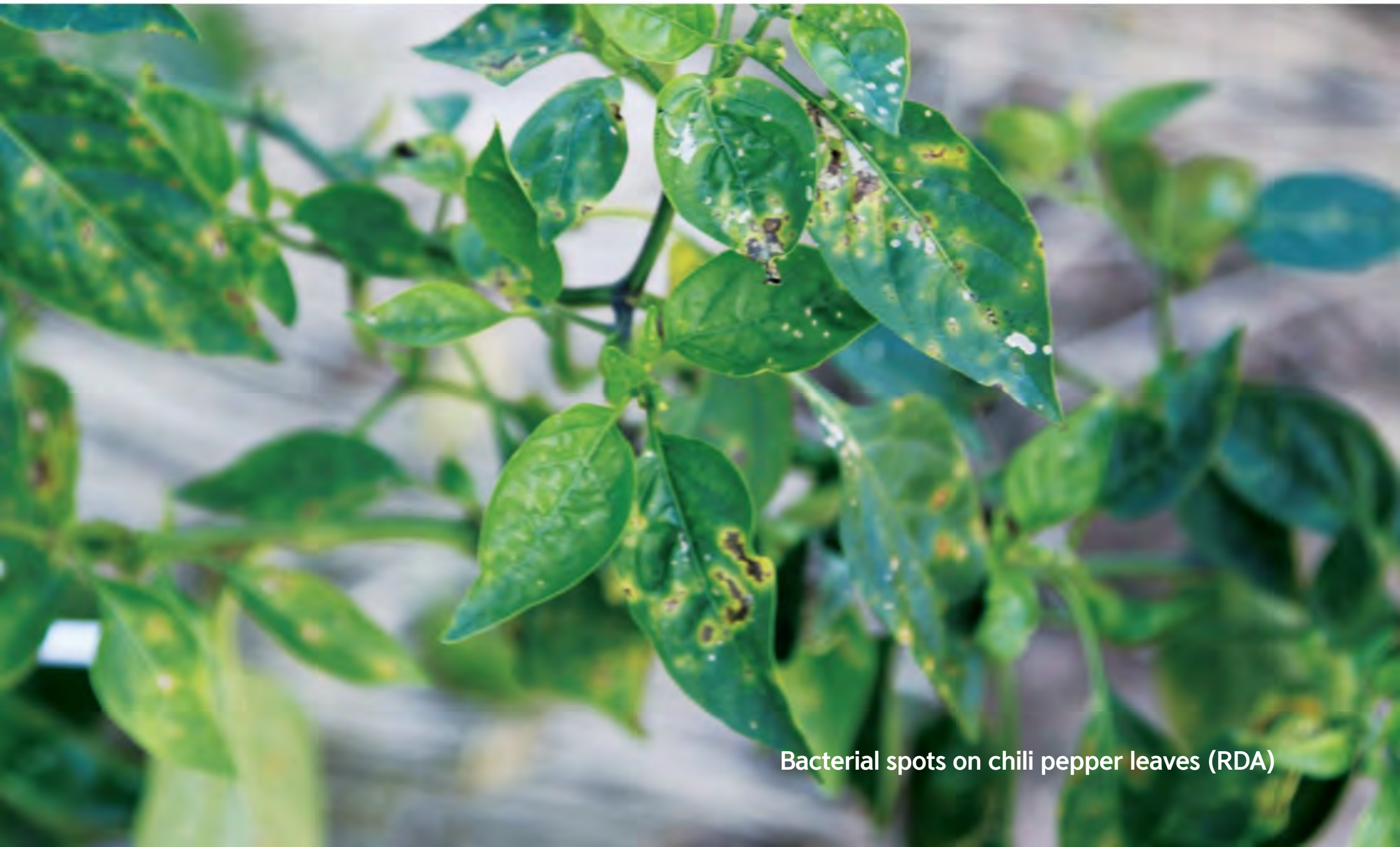
Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	Visible effect	3~4days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Bacterial spots on chili pepper leaves (RDA)


Bacterial spots on chili pepper leaves (RDA)


Bacterial spots on chili pepper leaves (RDA)

Fusarium wilt

Fusarium oxysporum

Occurrence environment

It is an infectious soil pathogen. When there is no crop, it lives through winter in the state of mycelial fragments or thick film spores in diseased plants' tissues. The moving distance is very short in water, and it is generally transmitted with soil particles to be transported long distances through agricultural equipment or people.

The pathogens mainly invade through fine roots or wounds and are often infected immediately after transplanting. The disease's occurrence is low, and the disease symptoms don't show strongly even when infected in a cold region, but the disease's symptoms may appear when the temperature rises in the middle or late growth period.

The suitable temperature for disease occurrence is around 24-30 ℃, and it rarely occurs below 16℃ and above 35 ℃. In general, it occurs in acidic soils (pH 4.5-5.5) and sandy soils but may not be significantly affected by soil acidity or moisture. Pathogens are widely distributed in the soil, and because of chlamydospores, it survives in the soil for several years without a host. However, it is challenging to control this disease because it can also be transmitted by seed.

Symptom description

It mainly occurs after the middle of growth, and the lower leaves of the diseased tree wilt and droop downward, similar to the initial symptoms of the plague. The disease progresses slowly, and the leaves turn slightly yellow and die slowly. Pathogens invade mainly from the part where the side roots come out. The diseased part has a dark brown color, and the terrestrial stem begins to rot.

Diseased roots or stems appear black as if burnt, but the skin is easily peeled off. Unlike the plague, the ground is not directly affected, but the fruit becomes small and imperfect.

(National Crop Pest Management System/NCPMS)

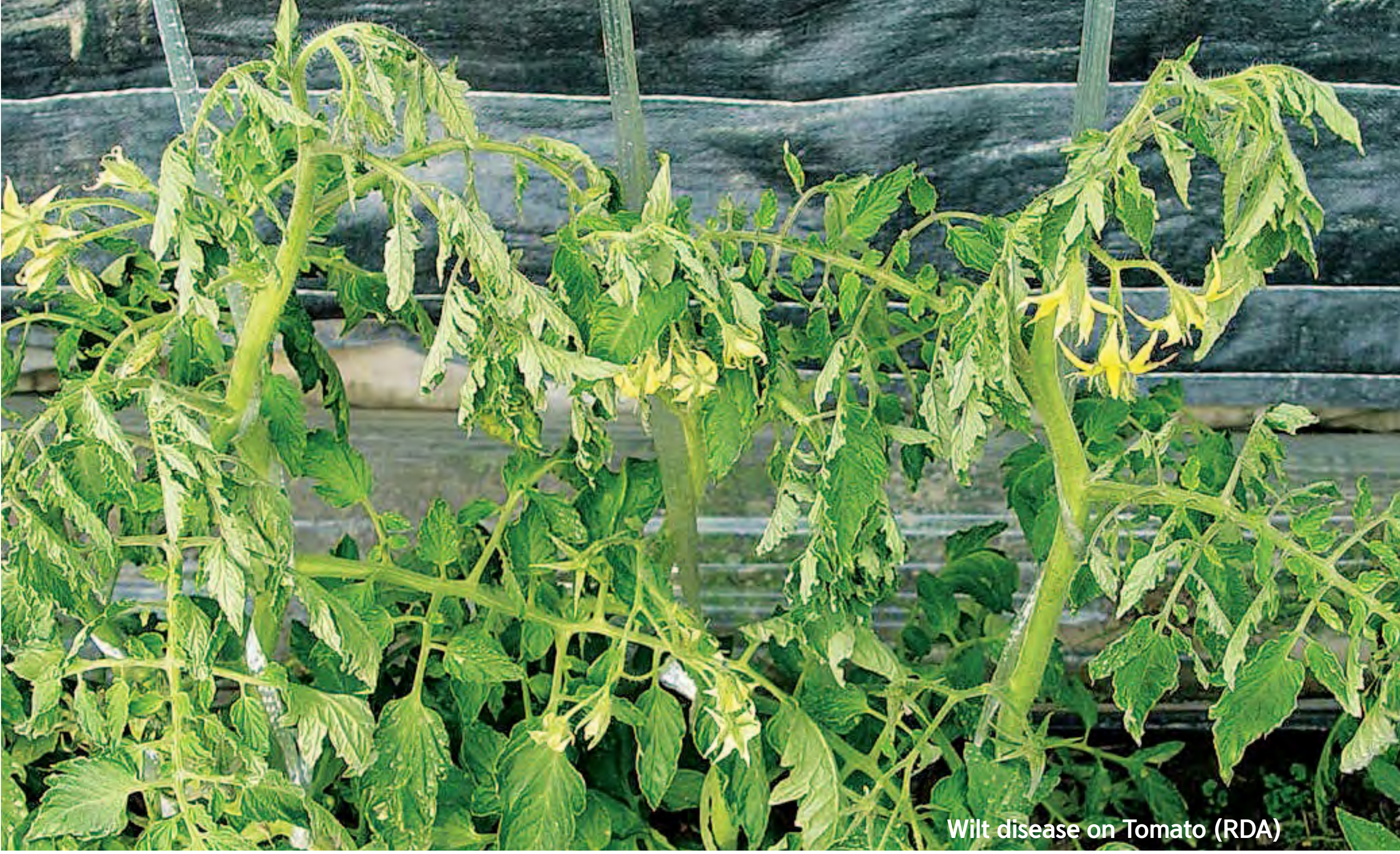
Refer to pages 25, 35~37

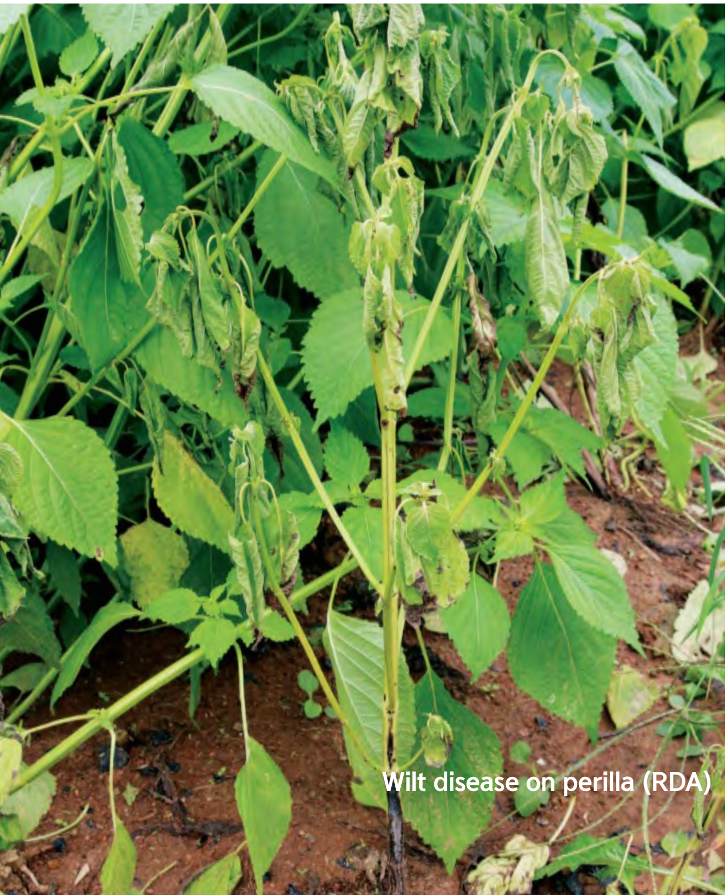
JADAM Natural Control Ratio

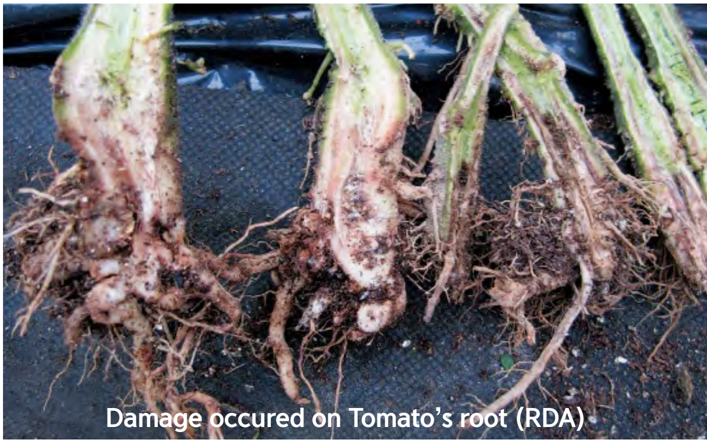
Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA			
JHS			
JMS	2000ml	2000ml	
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	5days

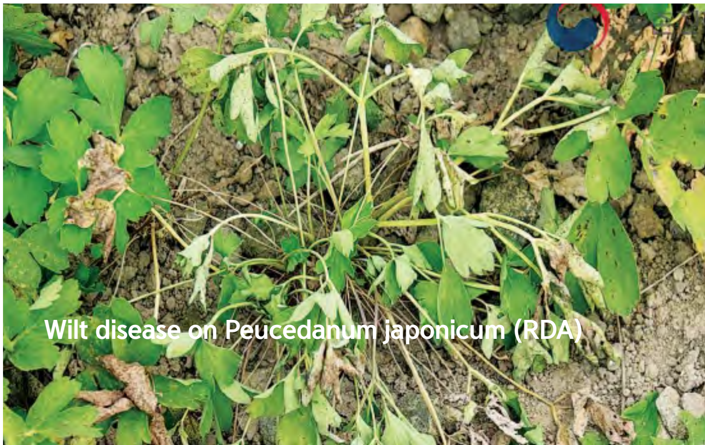
- Frequent irrigation of JMS before planting crops and frequent use of JMS during cultivation can prevent disease occurrence in advance. Diseases can be prevented when a lot of various microorganisms live in the soil.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz


Wilt disease on Tomato (RDA)


Wilt disease on perilla (RDA)


Damage occured on Tomato's root (RDA)


Wilt disease on Peucedanum japonicum (RDA)

Phytophthora blight

Phytophthora nicotianae

Occurrence environment

It occurs during the whole growing period from the seedling bed and occurs throughout the whole year in greenhouse cultivation. It occurs in the open field from the beginning of June, and it is predominantly found in the rainy season and is most severe in August and September.

If the soil is too wet for a long time, flooded, or drainage is poor, the disease is encouraged, but there are many occurrences in the field. Pathogens can transmit through seeds, but most of the contagious sources come from the soil.

Pathogens germinate again after winter in the state of hyphae or follicles in diseased plants' tissues and become the primary source of transmission. All variety of diseases are found in all cultivation areas.

Symptom description

It mainly occurs in the roots and the stems, but pathogens bounce off rainwater and occur in the above-ground areas such as leaves, fruits, and branches. When infected during the seedling stage, the whole tree wilts badly and dies.

Diseased trees in the middle or late growth period initially wilt, then turn red-yellow and dry out. The stem branch and thick roots of a diseased tree rot from the water soaked spot. When peeled, the inside of the stem is rotten and light or dark brown. Leaves, fruits, branches, etc. rot from the water soaked spot, and pathogens may appear white on the infected site.

(National Crop Pest Management System/NCPMS)

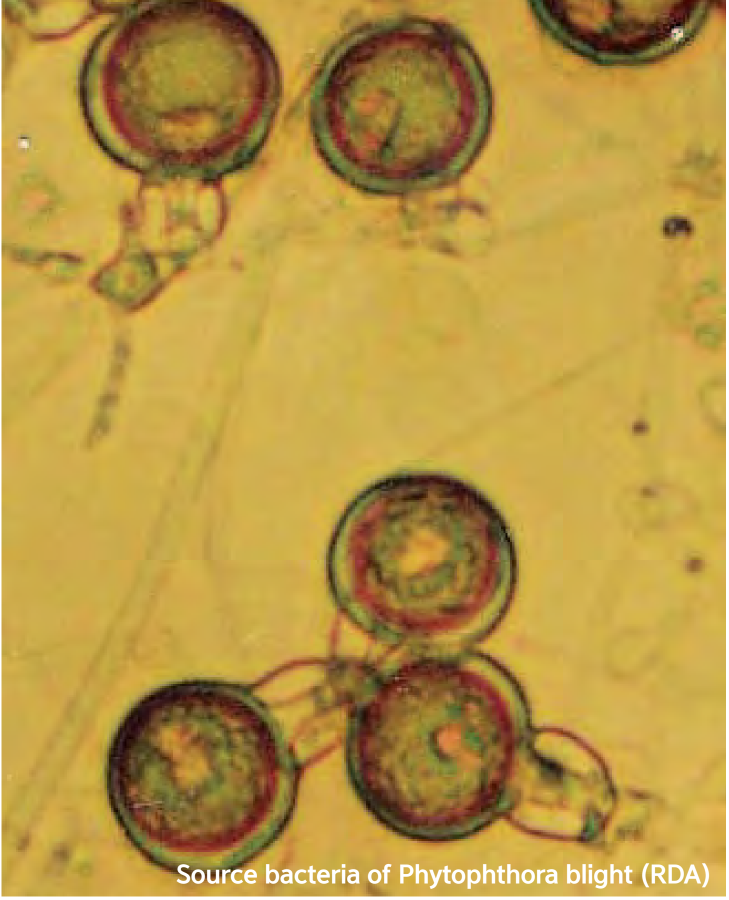
JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA			
JHS			
JMS	2000ml	2000ml	
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	5days

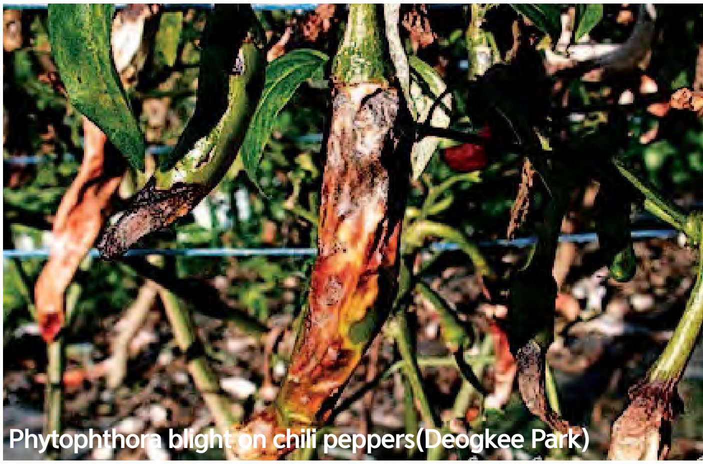
- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Frequent irrigation of JMS before planting crops and frequent use of JMS during cultivation can prevent disease occurrence in advance.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Source bacteria of Phytophthora blight (RDA)

Phytophthora blight on chili peppers (Deogkee Park)



Phytophthora blight on chili peppers(Deogkee Park)

Chili peppers farm destroyed with Phytophthora blight (Youngsang Cho)
)

Leaf mold

Passalora fulva

Occurrence environment

Pathogens spend winter on diseased leaves or seeds and become the primary transmission source, but pathogens sometimes stick to various agricultural materials and spend the winter in a greenhouse. Secondary transmission is caused by spreading spores formed on a lesion and invading through the leaves' pores. The damage is significant in temperatures of 20~25℃, especially in the greenhouse.

Symptom description

It occurs on the leaves. Initially, it appears as a white or light gray spot on the leaf's surface, and when it progresses, it expands to a yellowish-brown lesion. A pale brown lesion is formed on the back of the leaf, and brown fungi densely grow like a carpet on the lesion, and the colonies change from brown to pale purple when old. The damage is mainly on the lower leaves, and if severe, the entire lower leaves become yellow and dry.

(National Crop Pest Management System/NCPMS)

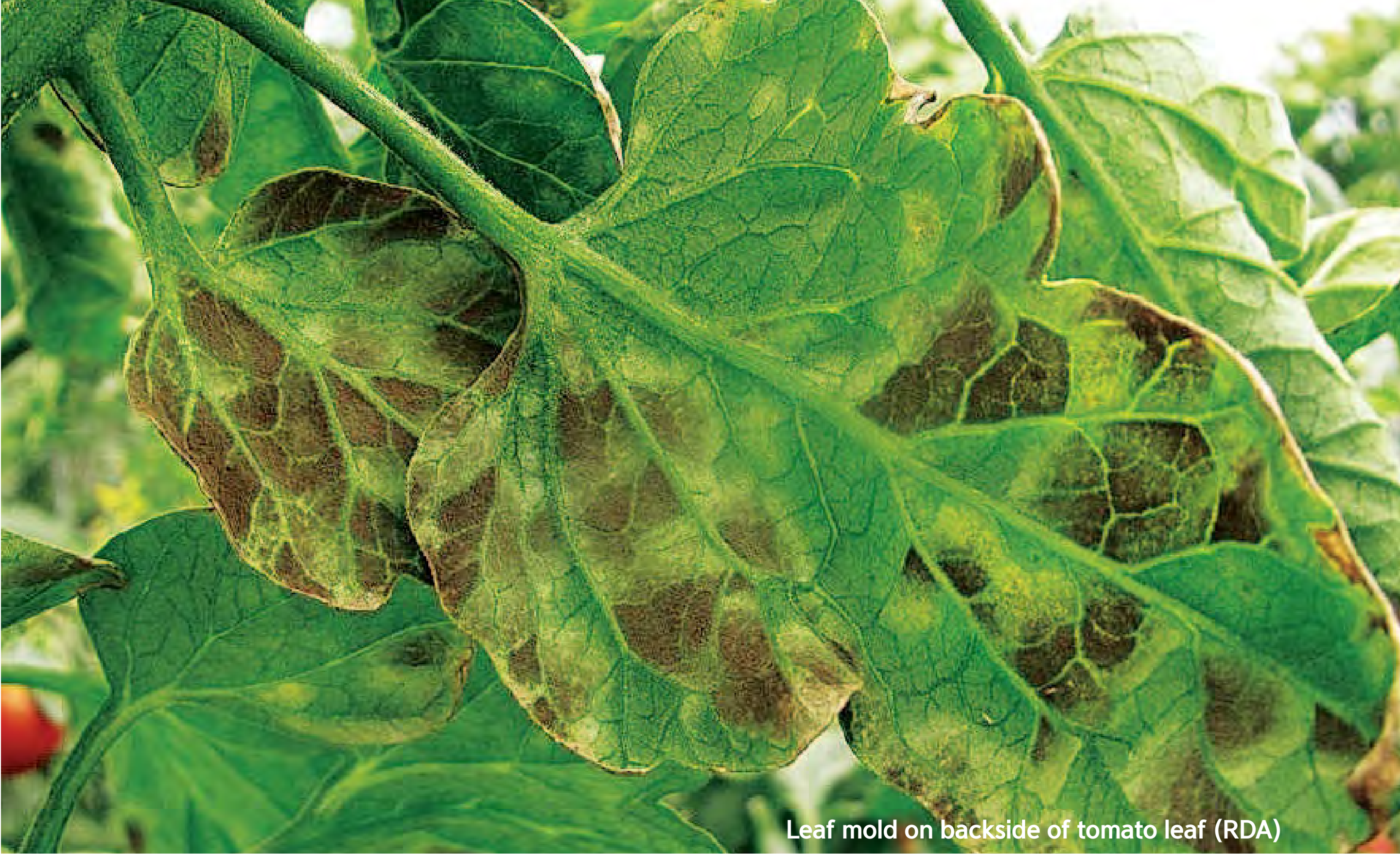
JADAM Natural Control Ratio

Refer to pages 25, 35~37

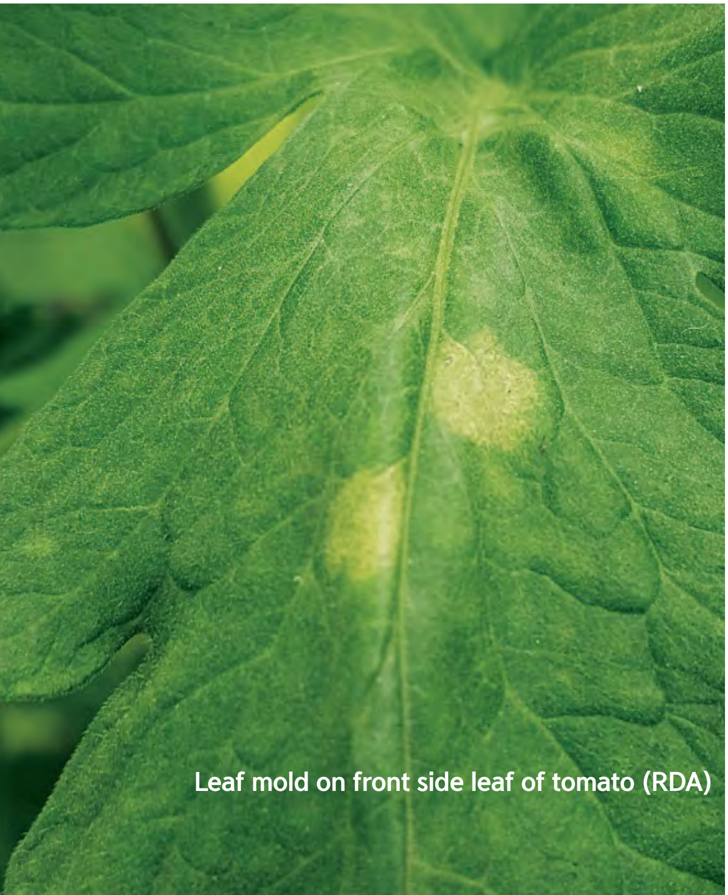
Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		30ml	40ml
JWA	200ml	400ml	500ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

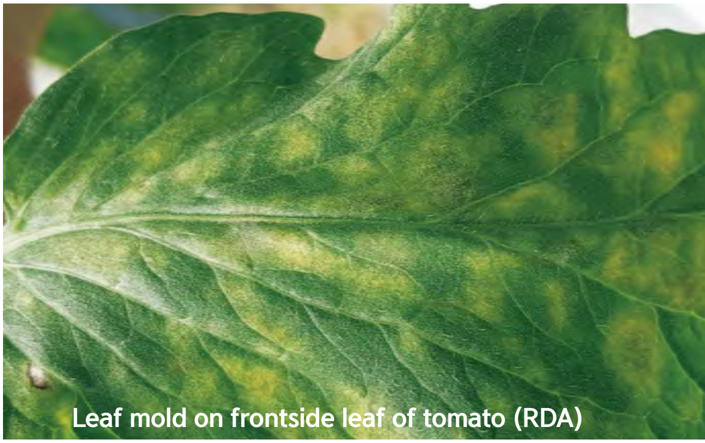
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



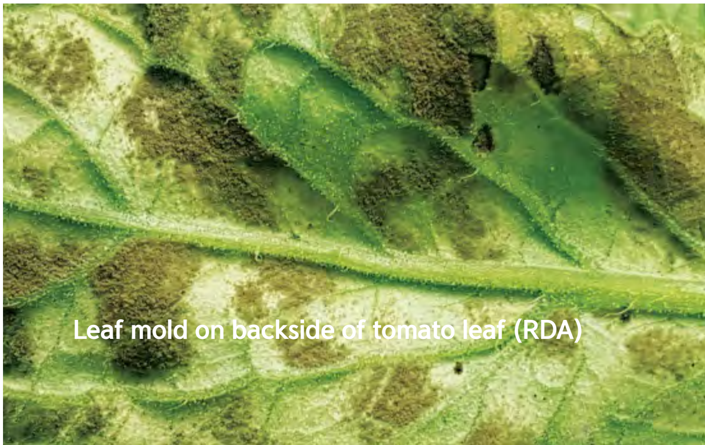
Leaf mold on backside of tomato leaf (RDA)



Leaf mold on front side leaf of tomato (RDA)



Leaf mold on frontside leaf of tomato (RDA)



Leaf mold on backside of tomato leaf (RDA)

Leaf blight

Heterosporium allii

Occurrence environment

Pathogens spend the winter in hyphae, conidia, and asciatica in the diseased area and become the primary transmission source. This disease is the most damaging disease on garlic, and it occurs most often in late growth. It generally occurs severely from April to May during the rainy season when the environment is very humid. In most severe cases, the number of products will drastically be reduced.

Symptom description

It occurs mainly on leaves, but it also occurs on leaf sheaths and scales in severe cases. The first small gray-white spots are formed on the leaves, and when progressing, the area around the lesion becomes light brown, and the central part turns reddish-brown.

Red-brown lesions or dark brown lesions are formed occasionally. The lesion is enlarged long, and in severe cases, it is discolored along the leaf veins to the tip of the leaf. Later, black mold (conidium) grows densely on the lesion.

(National Crop Pest Management System/NCPMS)

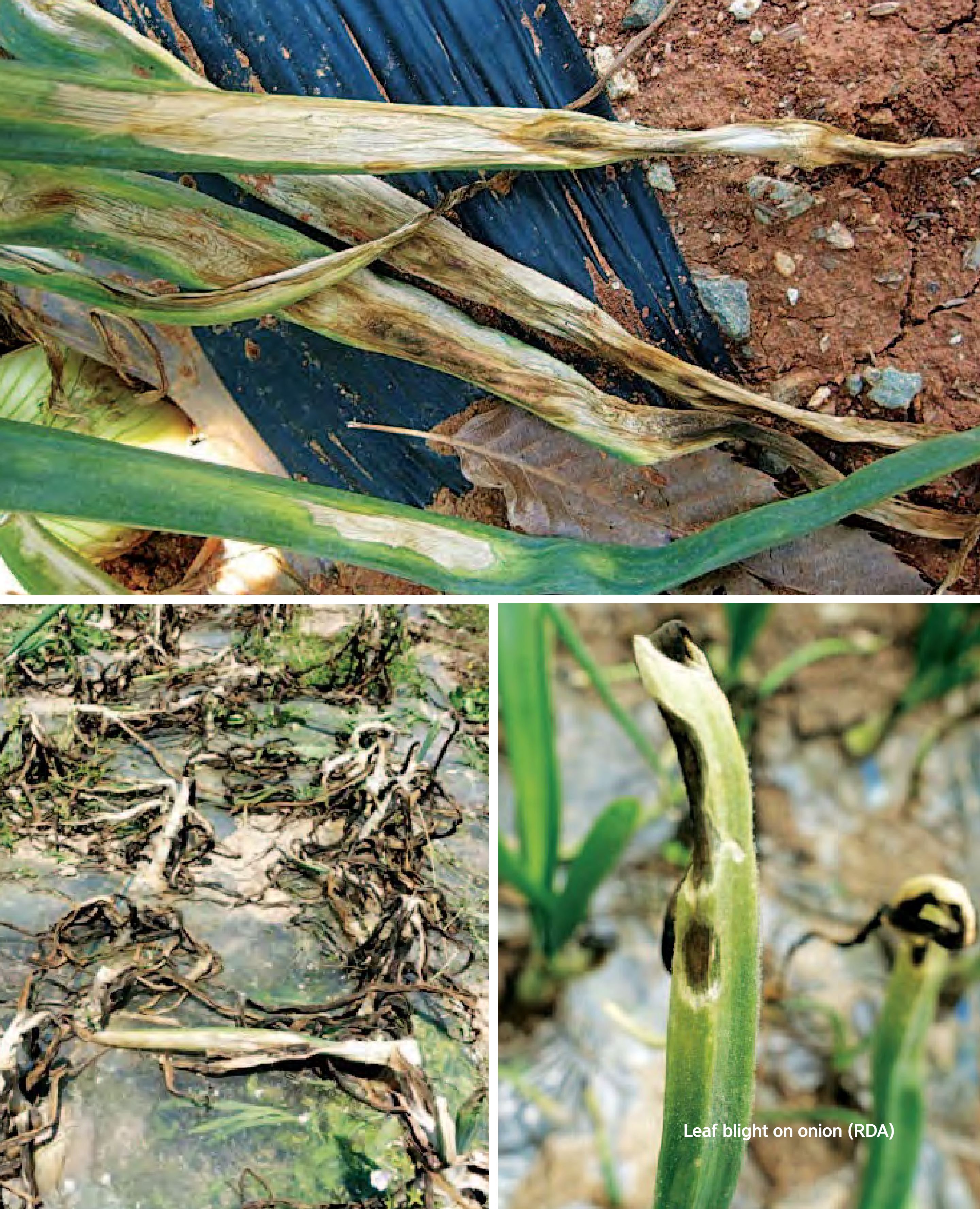
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS		60ml	80ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	**Visible effect**	2~3days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Frequent irrigation of JMS before planting can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Leaf blight on onion (RDA)

Leaf curl

Taphrina deformans

Occurrence environment

Pathogens are in the form of conidia that winters in the plant's stems and surfaces, which later become the primary transmission source in the following year. It occurs mainly in the early spring season, especially in regions where it is cold with frequent spring rains. The incidence varies greatly from year to year.

Symptom description

It occurs mainly on leaves but also occurs on new buds, flowers, and young fruit. At first, red to yellow ridges appear on the leaf surface and gradually thicken, and the leaves are wrinkled and shriveled. White powder (ascospore) is formed on the surface and back of a diseased leaf, and when it is old, it changes from brown to black and leaves fall. Infected flowers or young fruits fall early, making it difficult to identify symptoms, and young branches turn yellow and thicken, inhibiting growth. In severe cases, it may secrete resin and die.

(National Crop Pest Management System/NCPMS)

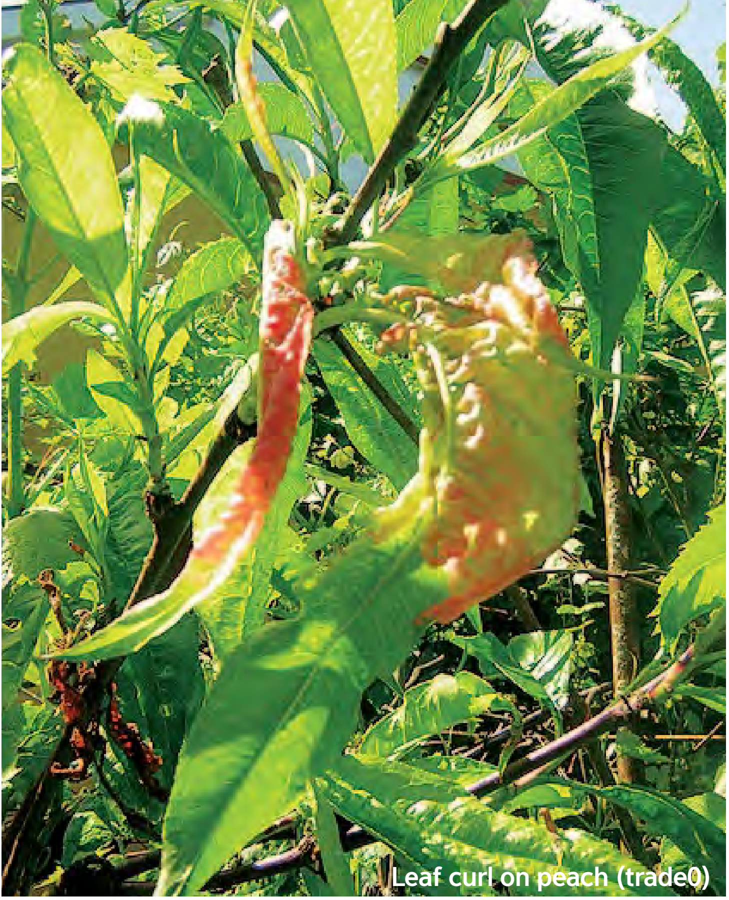
Refer to pages 25, 35~37

JADAM Natural Control Ratio

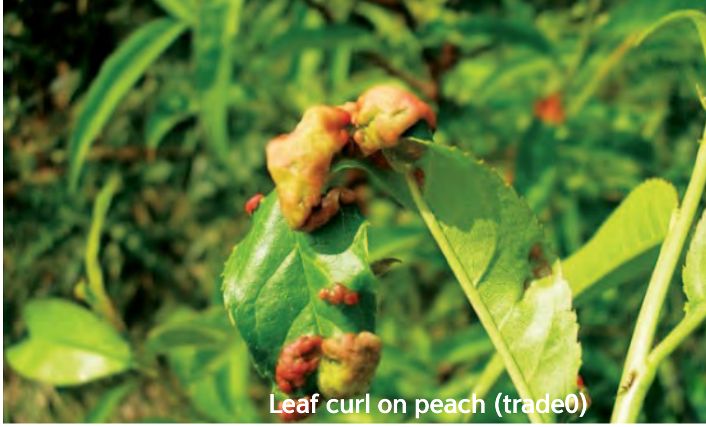
Standard (20L)	Prevention	Infestation	Emergency
JS		50ml	60ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	10days	**Visible effect**	3~4day

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

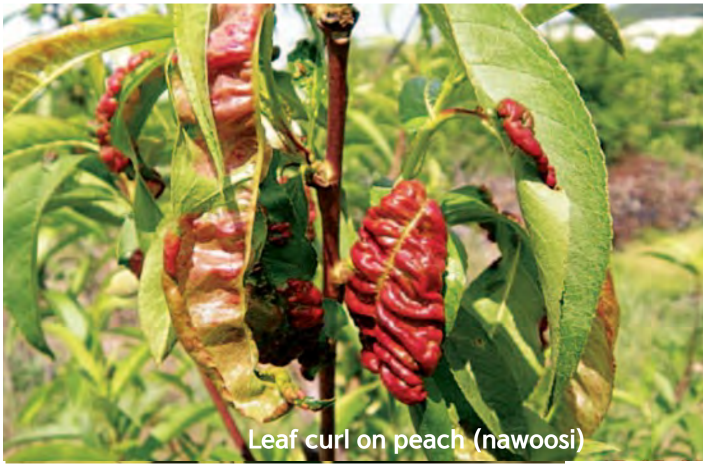
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



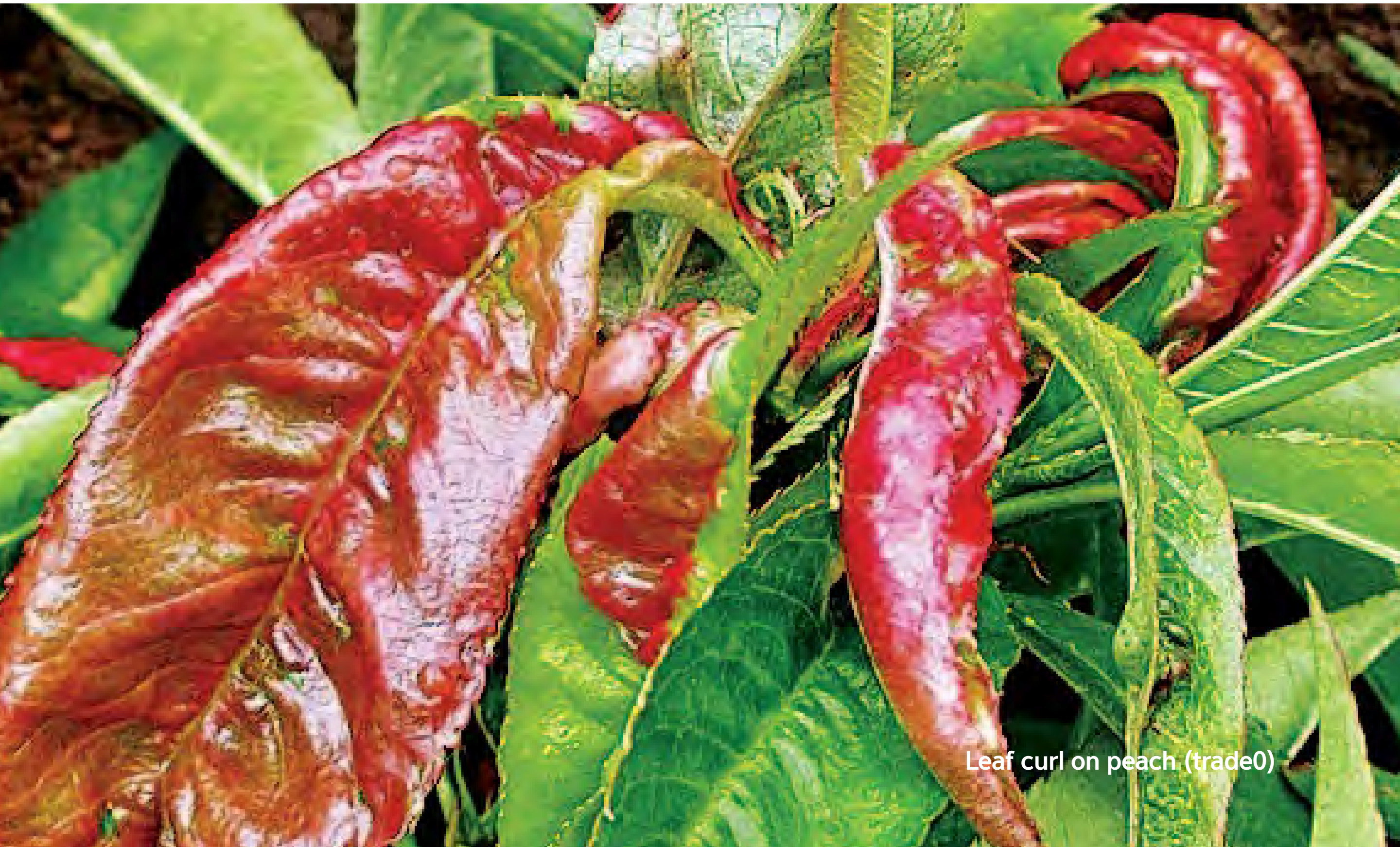
Leaf curl on peach (trade0)



Leaf curl on peach (trade0)



Leaf curl on peach (nawoosi)



Leaf curl on peach (trade0)

Damping-off

Pythium ultimum

Occurrence environment

Pythium ultimum forms oospores in the tissues of diseased plants and winter in the soil, then becomes a primary source of transmission after germination. It occurs severely in conditions where the temperature is a little cool (below 20℃), and the soil is humid, but external symptoms appear well when drying at high temperatures.

Pathogens that spent winter in the state of oospore in diseased plants germinate again when the soil temperature reaches 10℃ or higher and begin their activity. Pathogens propagate along the water and invade plants within 2-3 days after irrigation.

The infection source is mainly present in the soil but can be transmitted by irrigation, and pathogens can invade without wounding, but the invasion is more straightforward when there is a wound. Seed transmission is possible, but pathogens are mainly transmitted to soil, and disease outbreaks are further promoted when crops are exposed to moisture. It exists in the form of hyphae or scleroderma in the tissues of diseased plants or the soil and germinates after winter, causing the hyphae to invade the plant's branch or below the soil surface. It usually occurs well in moist soils.

Symptom description

It occurs from the seedling period to the early growth stage, and the branch part of the plant decays. Diseased plants fall well and later dry out. Two kinds of pathogens cause this disease. Symptoms caused by Pythium bacteria appear to decay the branch part of the plant into a water bed, and symptoms caused by Thanatephorus bacteria change the branch part from brown to dark brown and decay in a dry state.

(National Crop Pest Management System/NCPMS)

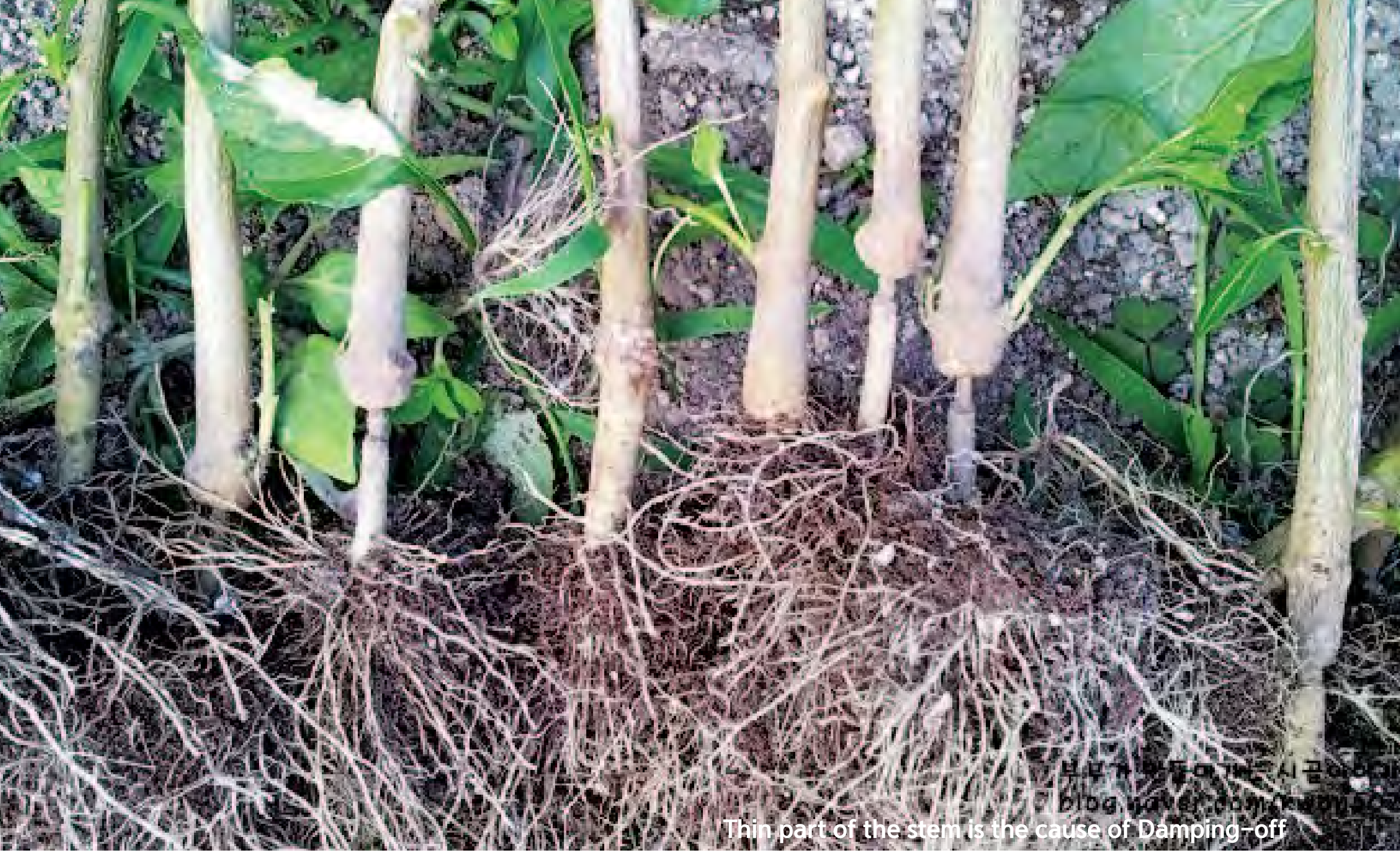
Refer to pages 25, 35~37

JADAM Natural Control Ratio

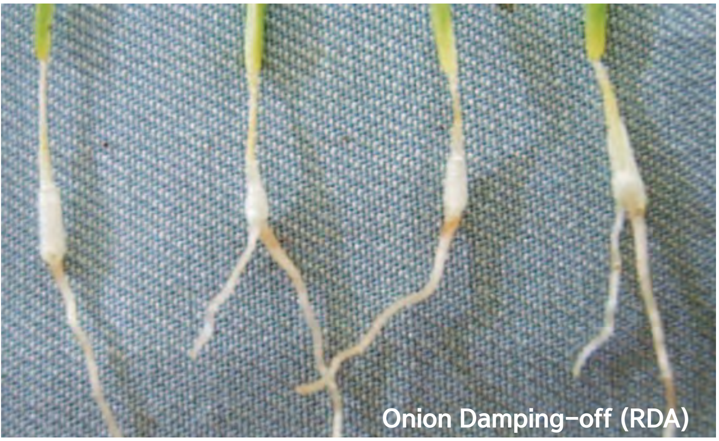
Standard (20L)	Prevention	Infestation	Emergency
JS		30ml	40ml
JWA	200ml	400ml	500ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Frequent irrigation of JMS before planting can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

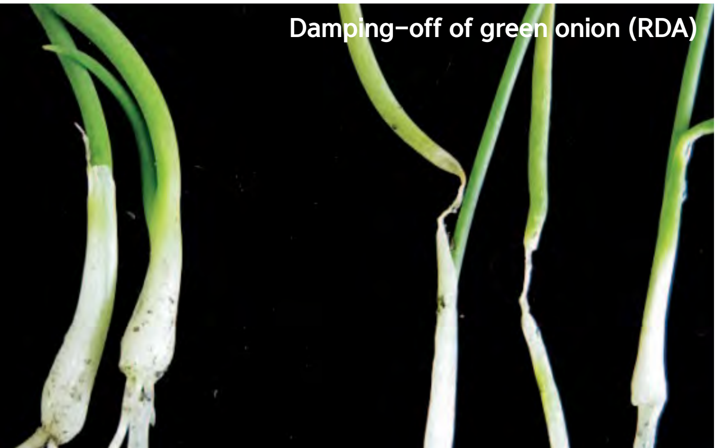
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



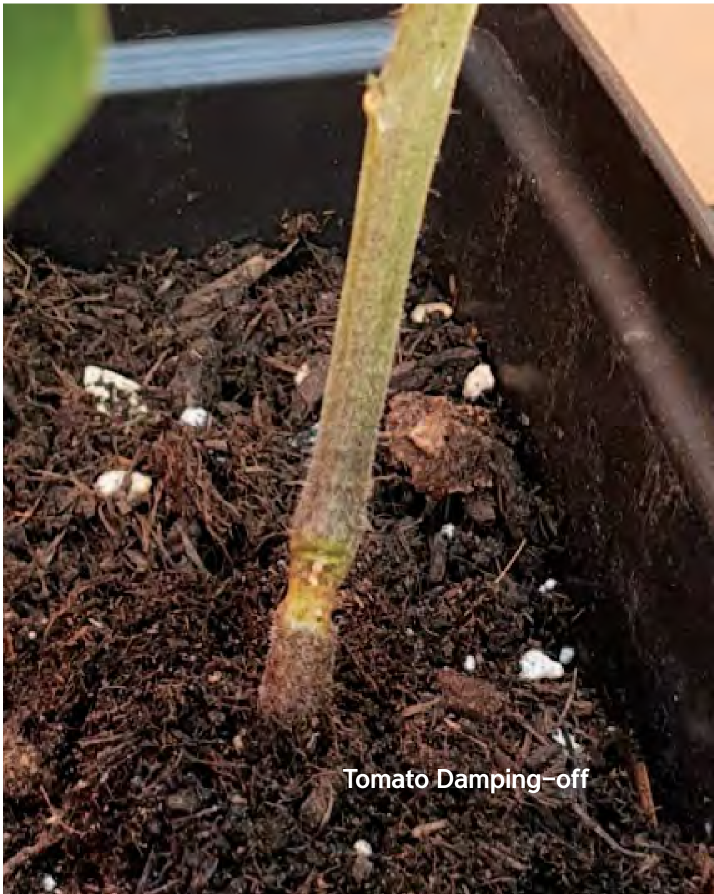
Thin part of the stem is the cause of Damping-off



Onion Damping-off (RDA)



Damping-off of green onion (RDA)



Tomato Damping-off

Gray mold

Botrytis cinerea

Occurrence environment

Pathogens overwinter in the form of sclerotium and conidium in the diseased part, becoming an infection source. In the greenhouse, if the temperature is less than 20 °C and humidity is high, powdery mildew occurs a lot in outdoors, it occurs mainly during the summer rainy season. Fruit infection mainly begins from the area where the flower is attached so, it is severe in varieties where flowers do not easily fall off as the fruit grows.

Symptom description

Powdery mildew mainly occurs on fruits, but it also occurs on leaves, flower petals, leafstalks, and fruit stems. The infected fruits display brown lesions, and if the disease progresses, the fruit will gradually decompose. The decomposed fruits are covered with gray conidium.

In the case of a leaf, the infections start from the part where the petals fall off. Dark brown lesions are displayed on the leafstalks and stems of fruits. If it continues, the stems dry out, and gray mold grows densely.

(National Crop Pest Management System/NCPMS)

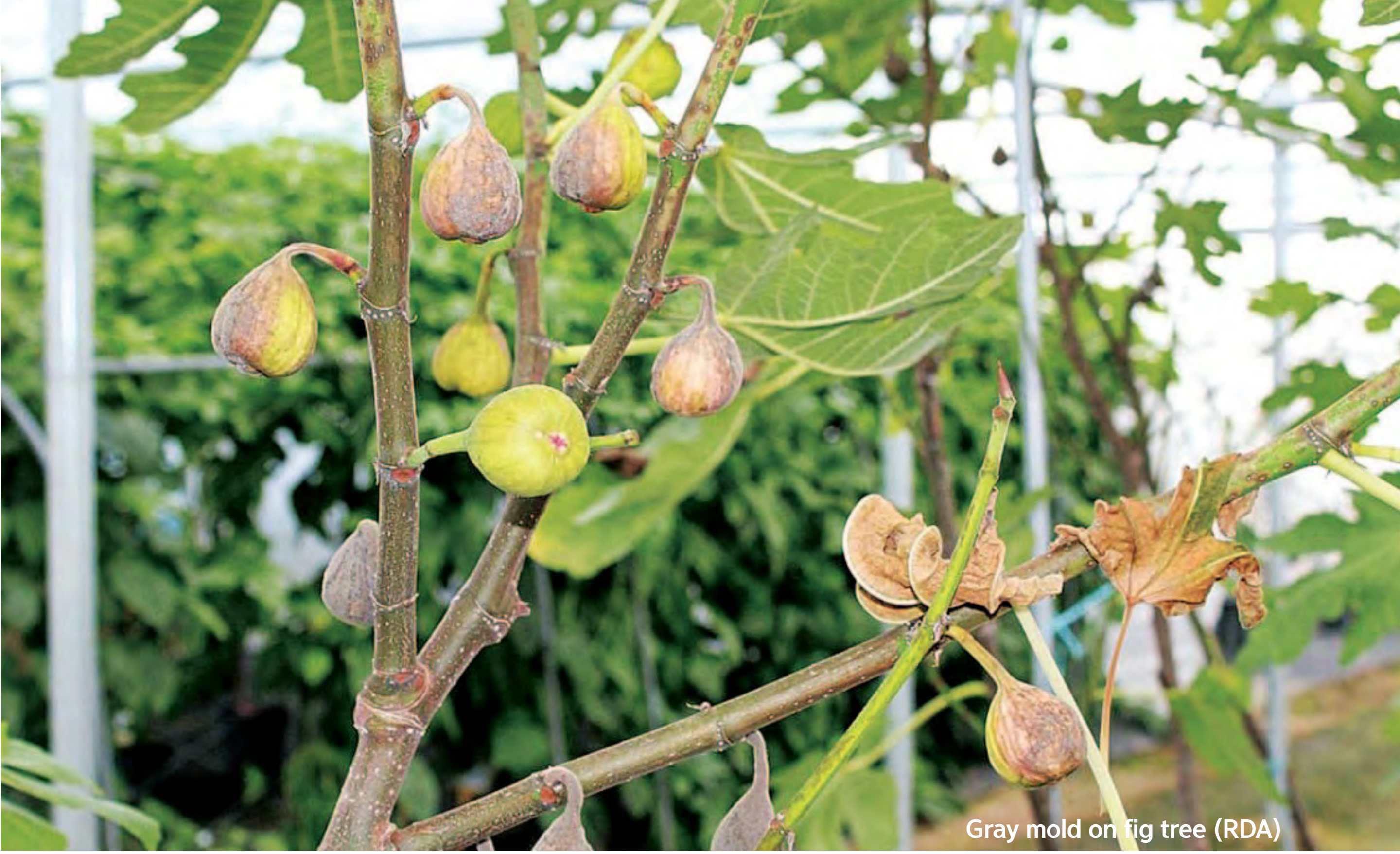
Refer to pages 25, 35~37

JADAM Natural Control Ratio

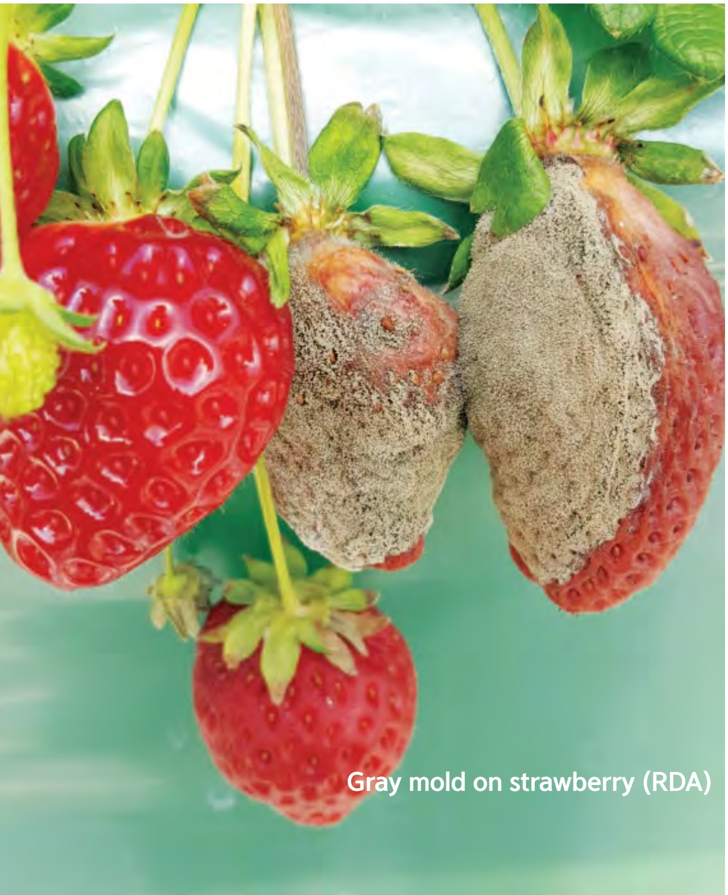
Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	50ml
JWA	200ml	500ml	600ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7days	Visible effect	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

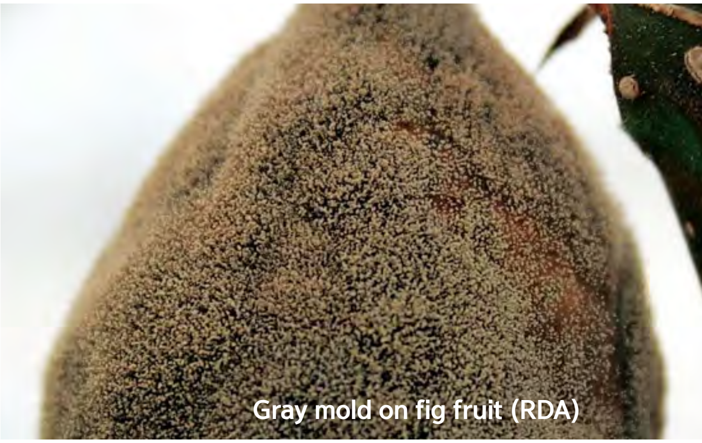
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



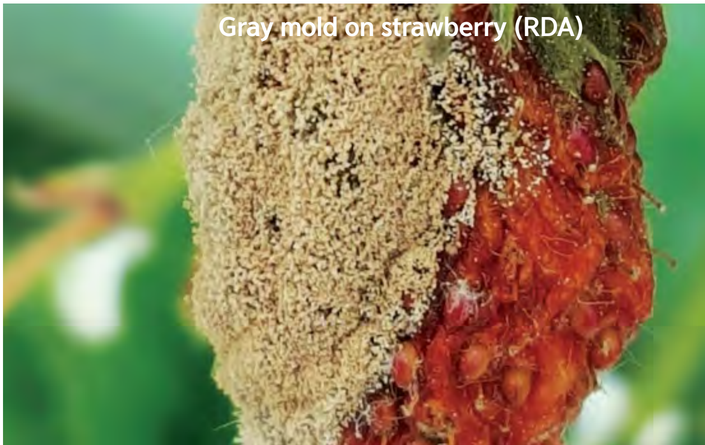
Gray mold on fig tree (RDA)



Gray mold on strawberry (RDA)



Gray mold on fig fruit (RDA)



Gray mold on strawberry (RDA)

Bakanae disease

Gibberella fujikuroi

Occurrence environment

Rice seeds infected with Bakanae disease bacteria quickly multiply using the nutrient source secreted while the rice seeds germinate and secrete gibberellin to cause Rice bakanae disease. The optimal temperature for disease growth is 35°C, and the possible outbreak temperature is around 25°C to 30°C after seeding. However, symptoms do not appear at 20°C.

The high temperature seems to make the conditions susceptible to infection. Secondary transmission is possible from infected seed to healthy seeds through the soil in a rice seedbed. Because it is aerobic bacteria, it can quickly spread in a rice seedbed or nursery facilities. On the other hand, there have been no secondary infection cases through the soil in this paddy field after transplanting.

Symptom description

The early symptoms of Bakanae disease show seedlings to grow 1.5 times higher than other seedlings. Then it slowly atrophies and dies within 1 to 2 weeks after sowing. The symptoms do not appear simultaneously but occur around 10 days after sowing. In the case of seeds severely infected with pathogens, they die while showing atrophy symptoms in rice seedbeds. The disease is identifiable in the seedbed period due to different growth in rice seedlings.

Moreover, the amount of diseased plants is about 10 times more than actually visible infected seedlings. After rice planting, the rice that showed symptoms in the paddy field immediately dies within 10 days, and after 2 to 3 weeks, symptoms appear, the node may turn to a brown color and forms white bacteria and spores on the stem. And in severe cases, the entire rice plant paddy dries up and dies.

(National Crop Pest Management System/NCPMS)

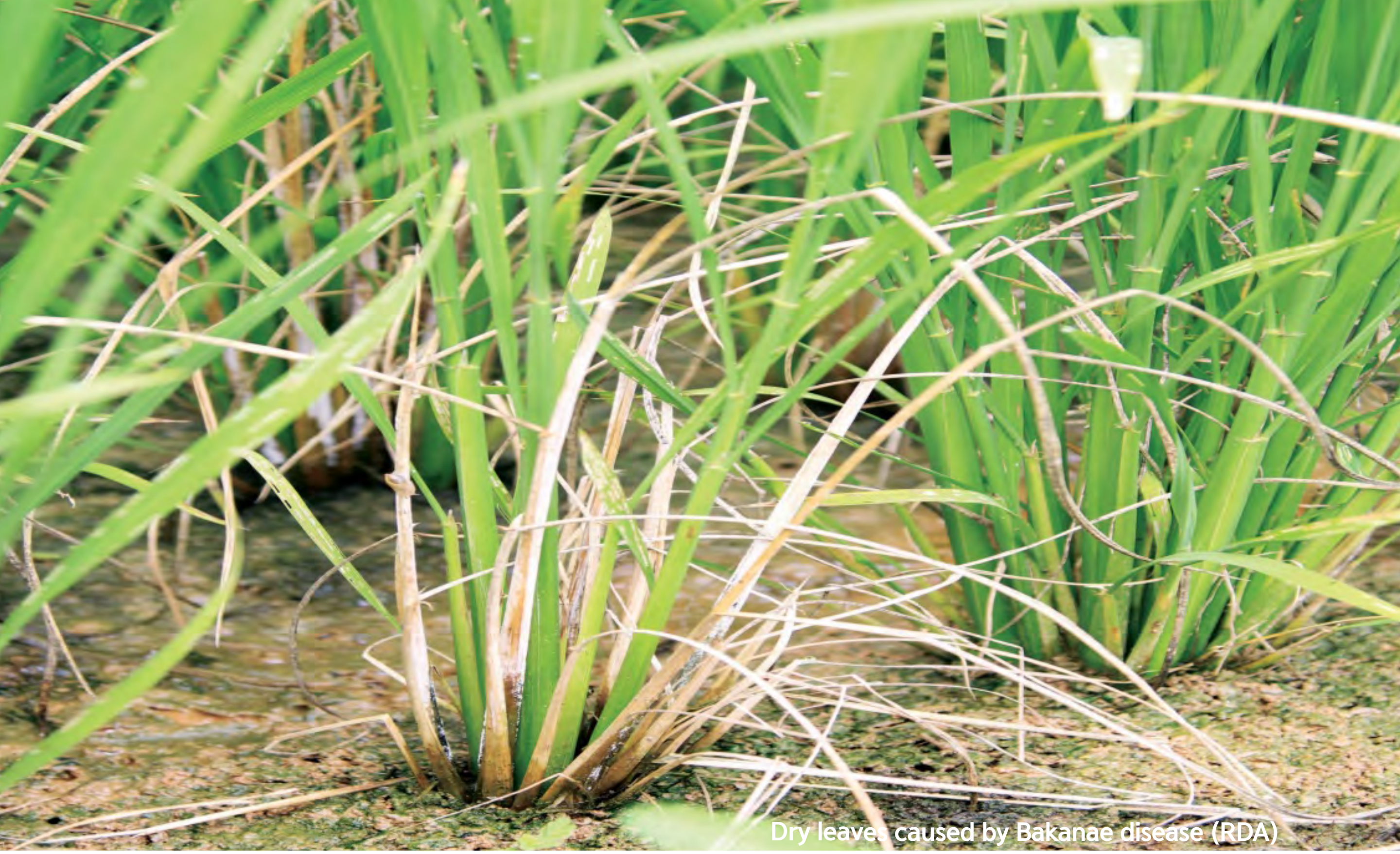
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	**Prevention**	**Infestation**	**Emergency**
JS	200ml		
JWA			
JHS			
JMS			
NaOH			
Fine soil			
Control interval	1 time	**Visible effect**	20days

- Submerging the rice seeds in No-heating water for 48~72 hours. It can almost completely cure Bakanae disease. Seeds with thick shells are immersed for 72 hours.
- We never imagined that JS would solve the problem of Bakanae disease, but it was successful by applying a method to increase the soaking time.

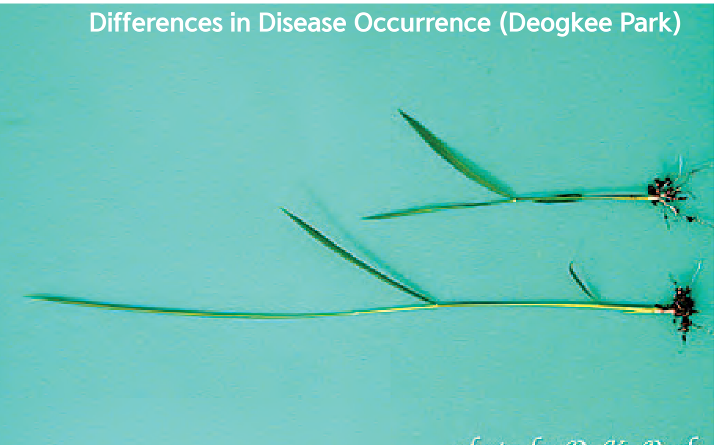
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

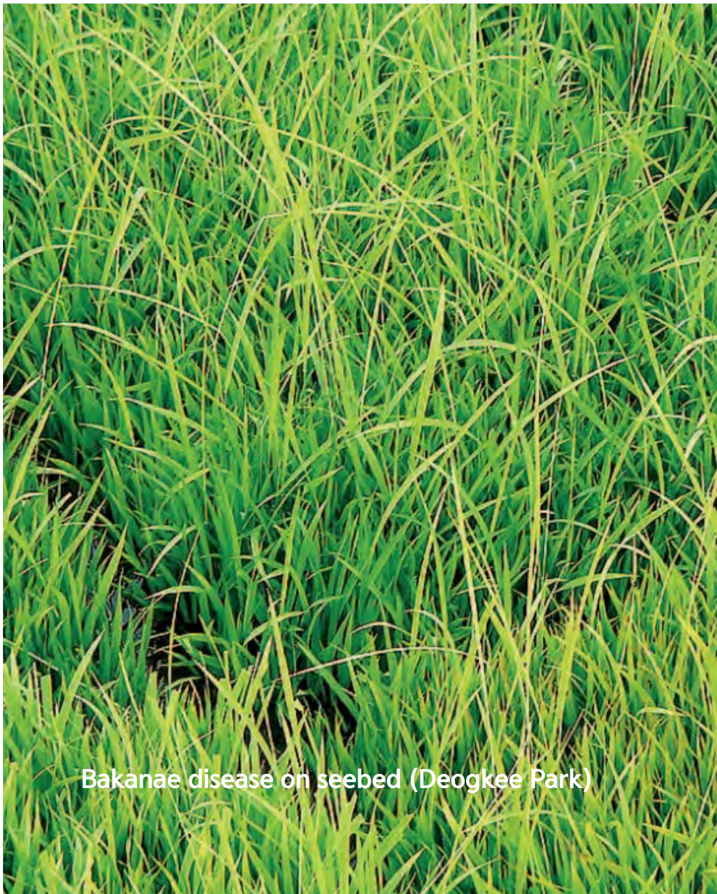


Dry leaves caused by Bakanae disease (RDA)

Bakanae disease on seedbed (Deogkee Park)

Differences in Disease Occurrence (Deogkee Park)





Bakanae disease on seedbed (Deogkee Park)

Anthracnose

Colletotrichum coccodes

Occurrence environment

These pathogens spend the winter in perithecium and hyphae in seeds or diseased areas and become the first infection source. Conidia mainly cause the overall disease, and the disease is more severe in the open field than in the greenhouse.

In the open field, conidia are mainly propagated by rain and wind during the summer's rainy season. In the case of peppers in the open field, the disease begins to develop from the beginning of July and continues to occur until the harvest season.

Symptom description

Anthracnose occurs mainly in fruits. The infected area initially appears as a circular spot that is slightly recessed. When it progresses, the lesion enlarges to a circular or amorphous double-patterned.

Yellow to yellowish-brown spores are formed on the lesion, and severely diseased fruits are twisted and dried. In some cases, lesions on mature fruits have black double-patterned symptoms, and some symptoms appear in the process of drying after harvesting.

(National Crop Pest Management System/NCPMS)

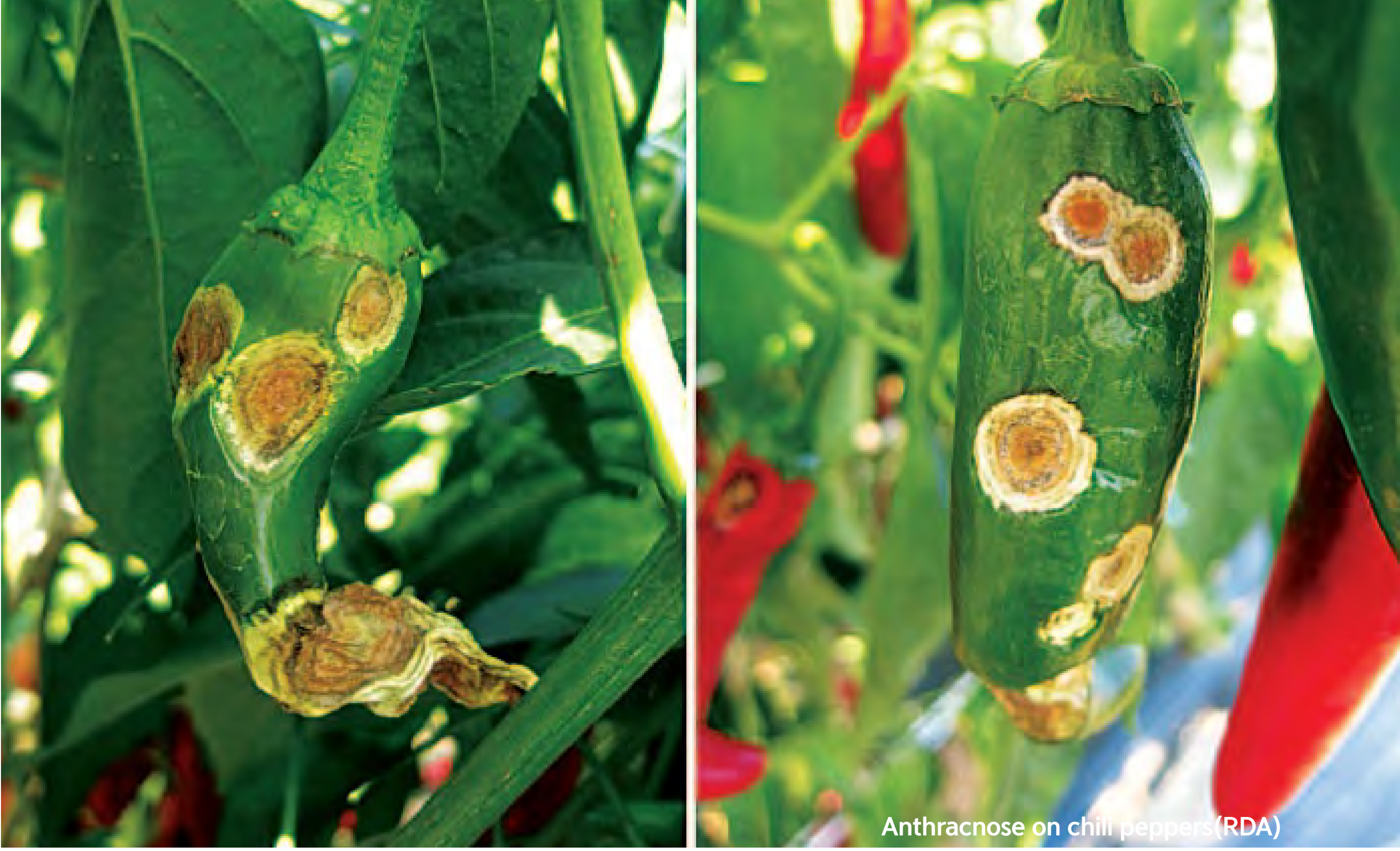
Refer to pages 25, 35~37

JADAM Natural Control Ratio

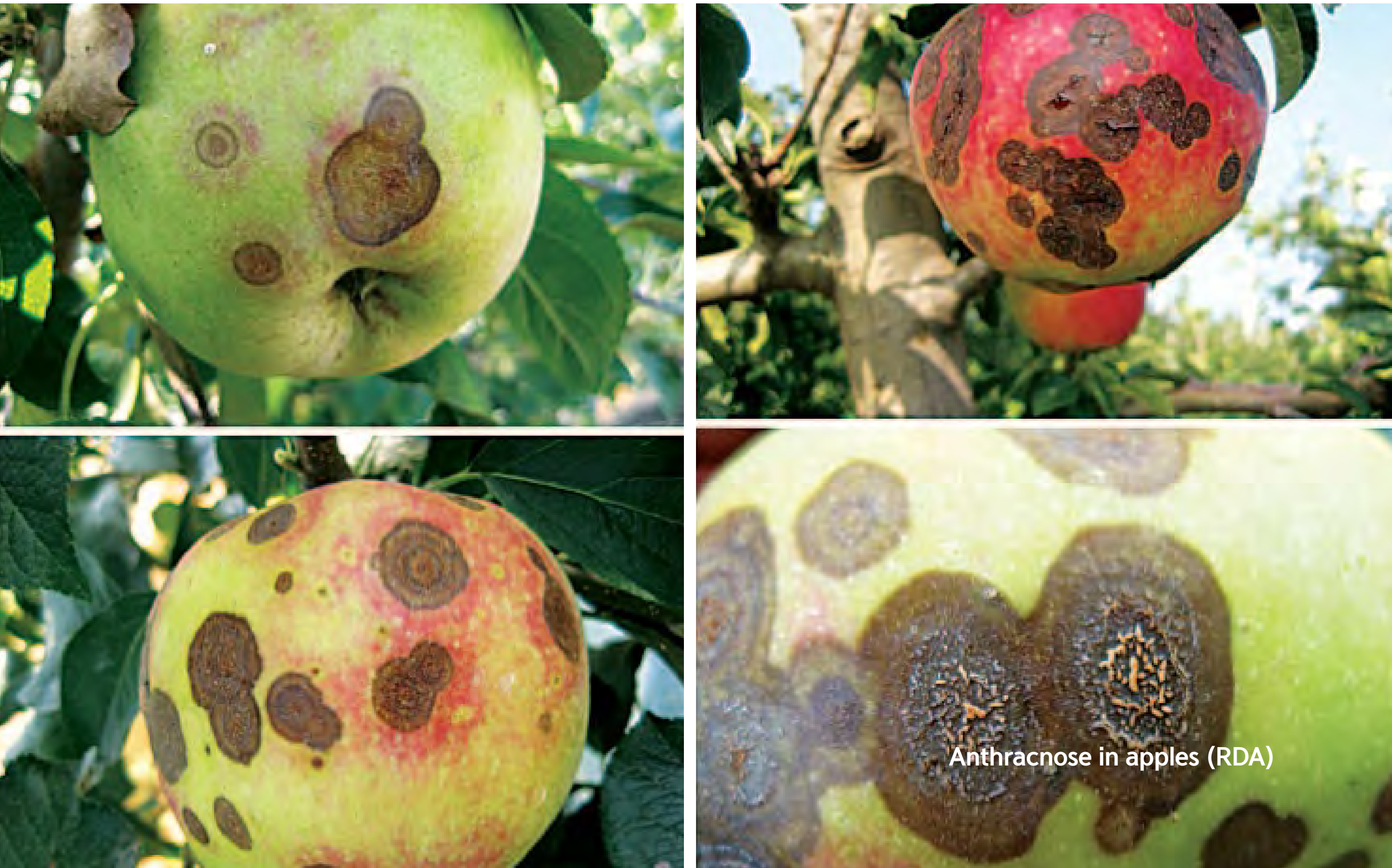
Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	500ml	700ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	5days	Visible effect	1~2days

- It is almost the only JADAM solution that provides strong control of anthracnose in the world.
- When anthracnose occurs, it spreads very quickly, so it is recommended to control it 2-3 times with an interval of 1~2.
- Soft water increases the control effect.
- Be careful of concentration damage when using JS.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Anthracnose on chili peppers(RDA)



Anthracnose in apples (RDA)

Powdery mildew

Leveillula taurica

Occurrence environment

Peppers, okra, tomatoes, eggplants, and cucumbers are known as disease-causing host plants. It occurs severely during a dry season like autumn in a greenhouse area. Conidia are transmitted to the air, and under dry conditions, the contaminant ability is maintained for 80 days. Powdery mildew bacteria are known to occur in greenhouses with an electric heater.

Symptom description

It mainly affects leaves, at the beginning of the onset, one part of the leaf looks like white powder, which is a conidium created after powdery mildew bacteria settle on the leaf's surface. When the disease progresses, white powder spreads to the leaf's backside. As time passes, it appears small black particles are formed around the old lesion. It occurs on the leaf's front and back sides, and the disease is more severe on the backside. If the disease persists, the leaves gradually turn yellow and become mottled and dry off from the lower leaves.

(National Crop Pest Management System/NCPMS)

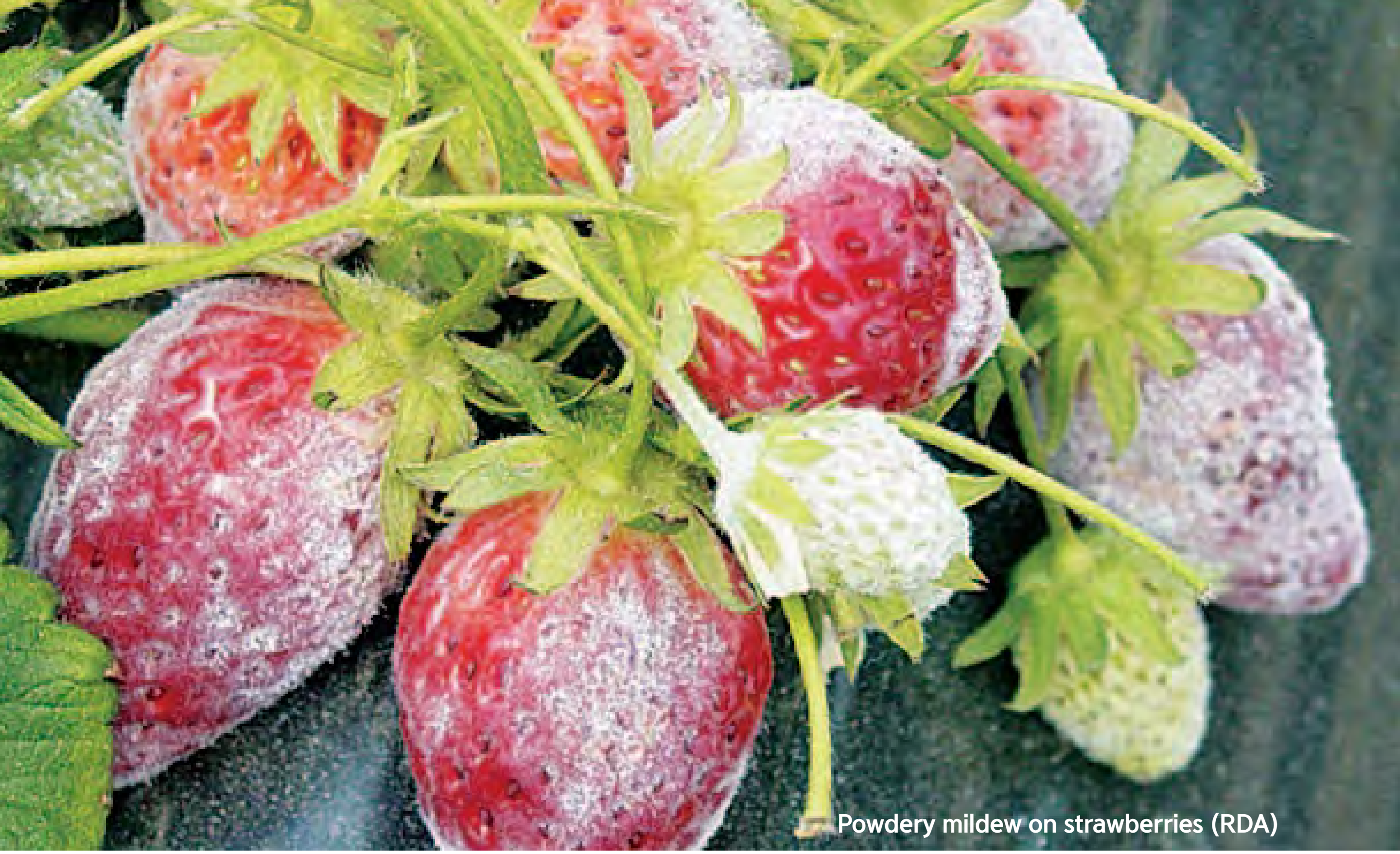
JADAM Natural Control Ratio

Refer to pages 25, 35~37

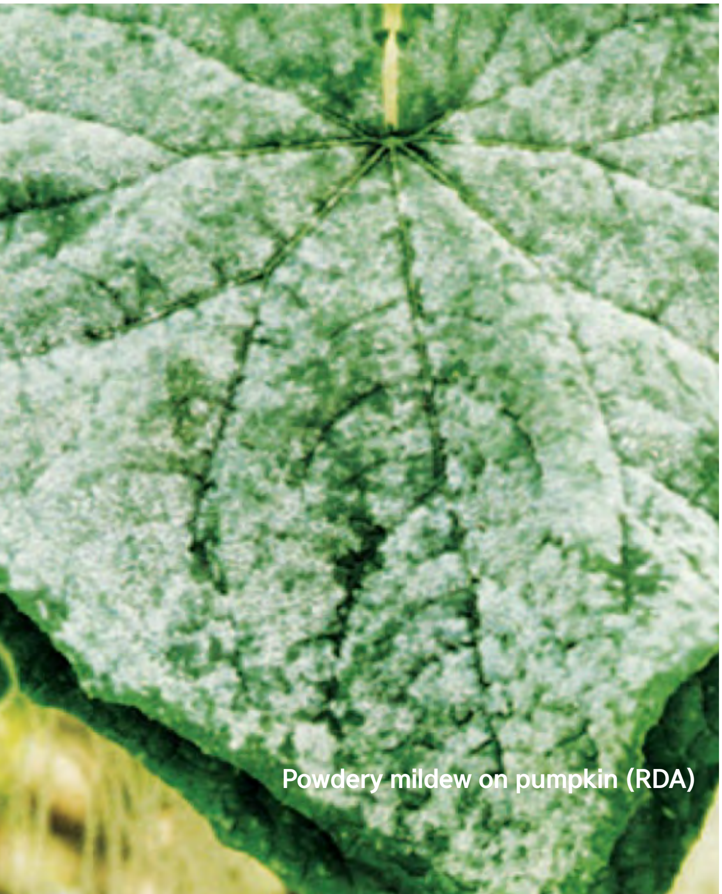
Standard (20L)	Prevention	Infestation	Emergency
JS		30ml	40ml
JWA	200ml	400ml	500ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	7 days	Visible effect	1~2 days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

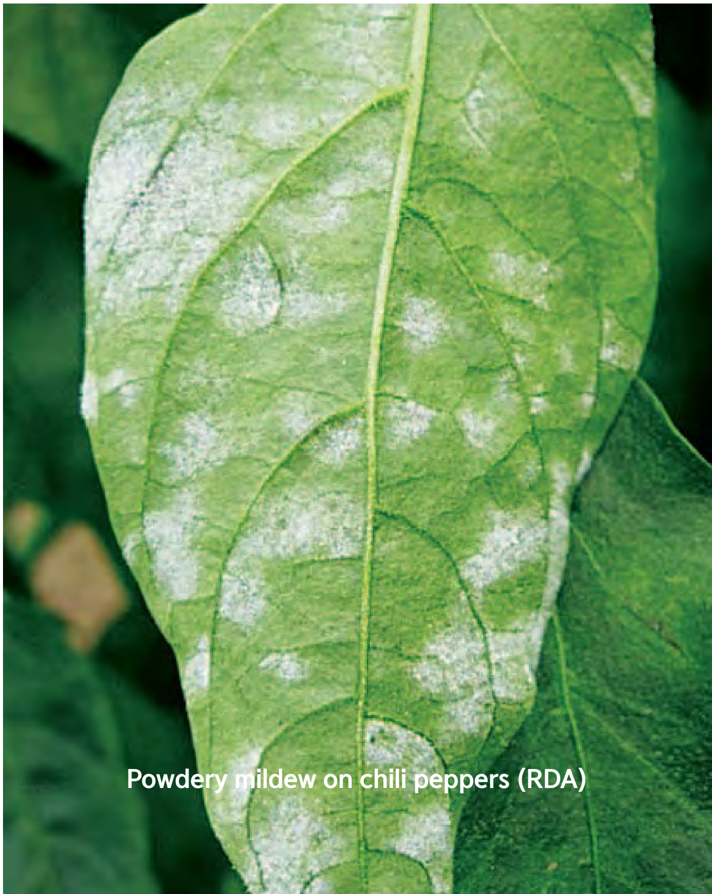
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Powdery mildew on strawberries (RDA)



Powdery mildew on pumpkin (RDA)



Powdery mildew on chili peppers (RDA)

Cedar apple rust

Gymnosporangium asiaticum

Occurrence environment

Pathogens parasitize on pear trees from April to May and juniper trees after June, where they spend the winter in the form of mycelium. When it rains from April to May, winter spores formed on juniper trees to form sporidium, this sporidium is then transferred to a pear tree by the wind and invades through the periostracum or stomata of young leaves, young branches, and fruits. The incubation period of the following spore is 8 to 9 days: sporidium forms mycelium that contains rust spores that causes rust disease. Rust spore in May and June, and can be seen about 1 month after infection.

Symptom description

On the leaf, small orange-yellow spots appear at first, and as it expands, a long pale yellow trichome appears behind the lesion. In severe cases, the entire leaf is dyed red. Similar symptoms appear in fruits and new branches. A part of the leaf turns yellow in early March in juniper, and as it progresses, a brown pyramidal telium is formed.

(National Crop Pest Management System/NCPMS)

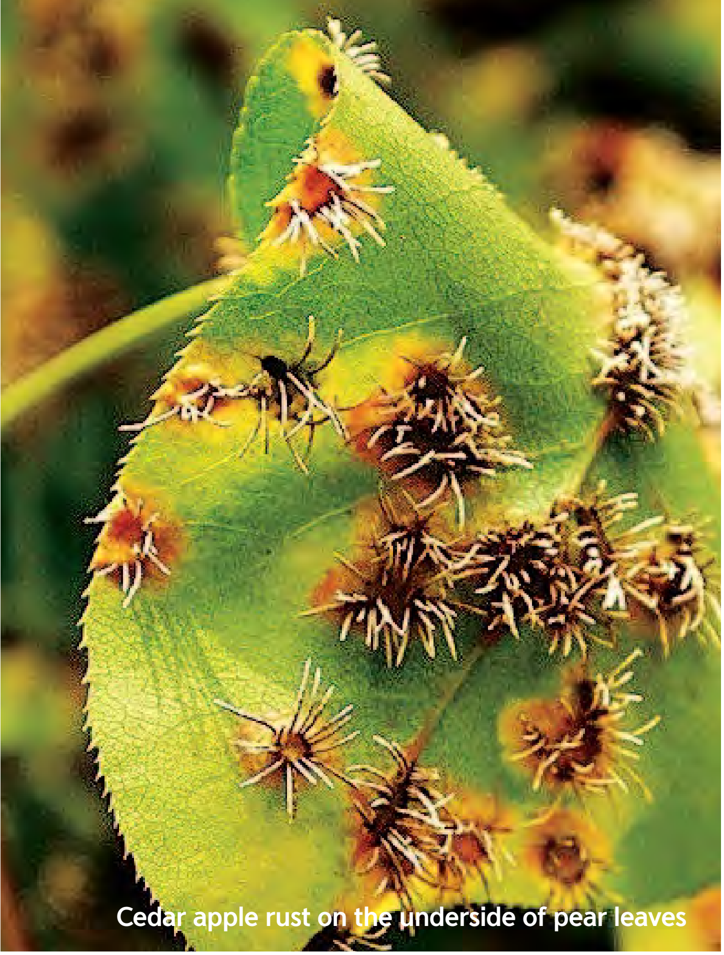
Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	60ml
JWA	200ml	500ml	700ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	15days	Visible effect	1~2days

- JADAM solution effectively controls this disease.
- In particular, this disease can be effective only when it is sprayed at the time of the strongest sunlight on a sunny day.
- Soft water increases the control effect.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



Cedar apple rust on the underside of pear leaves

(Youngsang Cho)

(Youngsang Cho)

JADAM Solution evaporate quicker when it is sprayed under strong sunlight (Youngsang Cho)

Bacterial shot hole

Xanthomonas campestris pv

Occurrence environment

Peach bacterial shot hole rust spores are transferred to juniper by the wind from May to June and July. The symptoms may appear during autumn of that following year. Wintered spores in juniper trees start to appear after March of the following year. The wintered spores germinate from mid-April along with rain and survive semi-permanently for more than 6 years, becoming a source of infection. Rain is mandatory for wintered spores to germinate on juniper trees. However, the duration of rainfall should be consistent at least 6-8 hours. The optimum temperature for germination of wintered spores is 13~20℃, and it does not occur below 7℃ or above 30℃. The sporidium is extremely weak to drying and has a short life. Rust spores have the best germination ability immediately after maturation, the optimum temperature is 10~27℃, and the elongation of the germ tube is best around 25℃. The effective overall distance between sporidium and rust spore is about 1.5 km, but the closer the pear and juniper trees are, the more likely to be infected further in radius.

Symptom description

Pathogens that have passed the winter in the diseased tissue are ejected in spring when the temperature and humidity are appropriate and transmitted to the new body by wind or rainwater. The outbreak starts in April and peaks in July, the rainy season. Leaves or branches that develop after the rainy season become a source of transmission the following year.

It occurs mainly on leaves but also on branches and fruits. Lesions formed on leaves in spring are water-acicular, reddish-purple to brown. Later, a hole forms when the dead tissue comes off. The symptoms change from reddish purple to dark brown on the branch and cause the death of branches in severe cases. The early symptoms of young fruit are yellow, then gradually turn black, and the area around the lesion becomes greenish-yellow.

(National Crop Pest Management System/NCPMS)

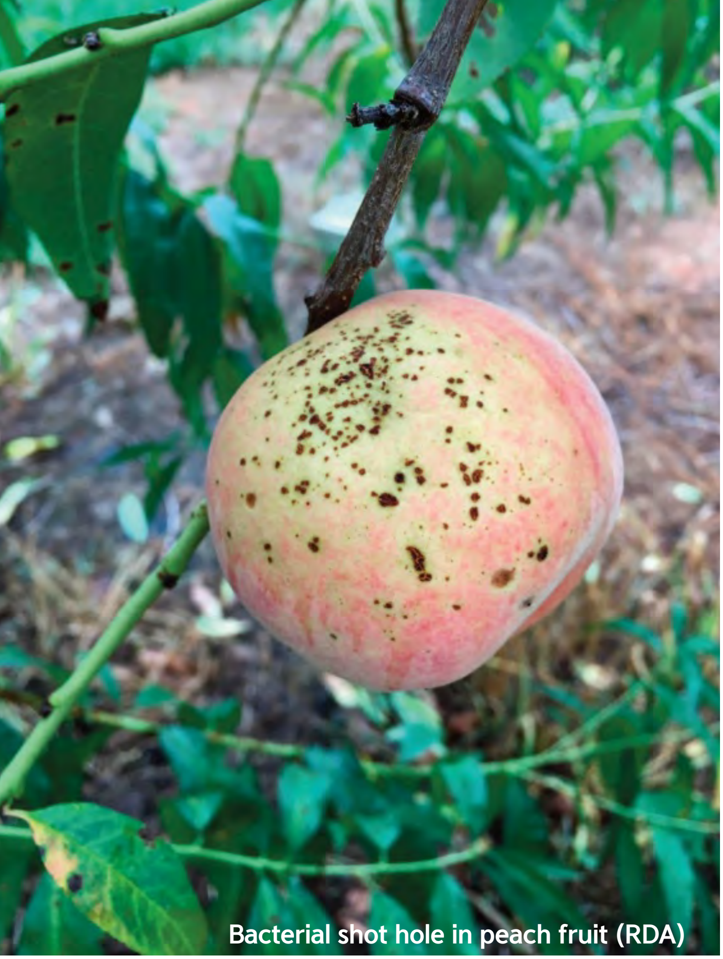
JADAM Natural Control Ratio

Refer to pages 25, 35~37

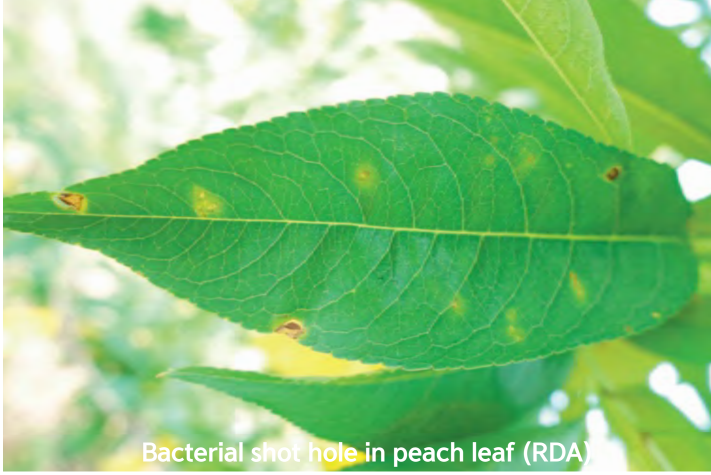
Standard (20L)	Prevention	Infestation	Emergency
JS		50ml	60ml
JWA	200ml	500ml	700ml
JHS			
JMS	1000ml		
NaOH			
Fine soil			
Control interval	5days	Visible effect	1~2days

- JADAM solution effectively controls this disease.
- You can flexibly adjust the control interval.
- Soft water increases the control effect.
- Foliar spraying with a mixture of JMS and JWA can prevent disease occurrence in advance.
- Be careful of concentration damage when using JS.
- Add JHS, and it becomes a germicide & insecticide.

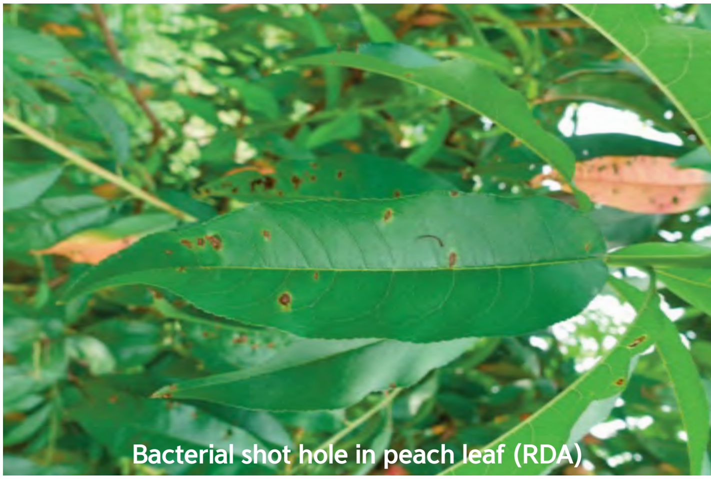
20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



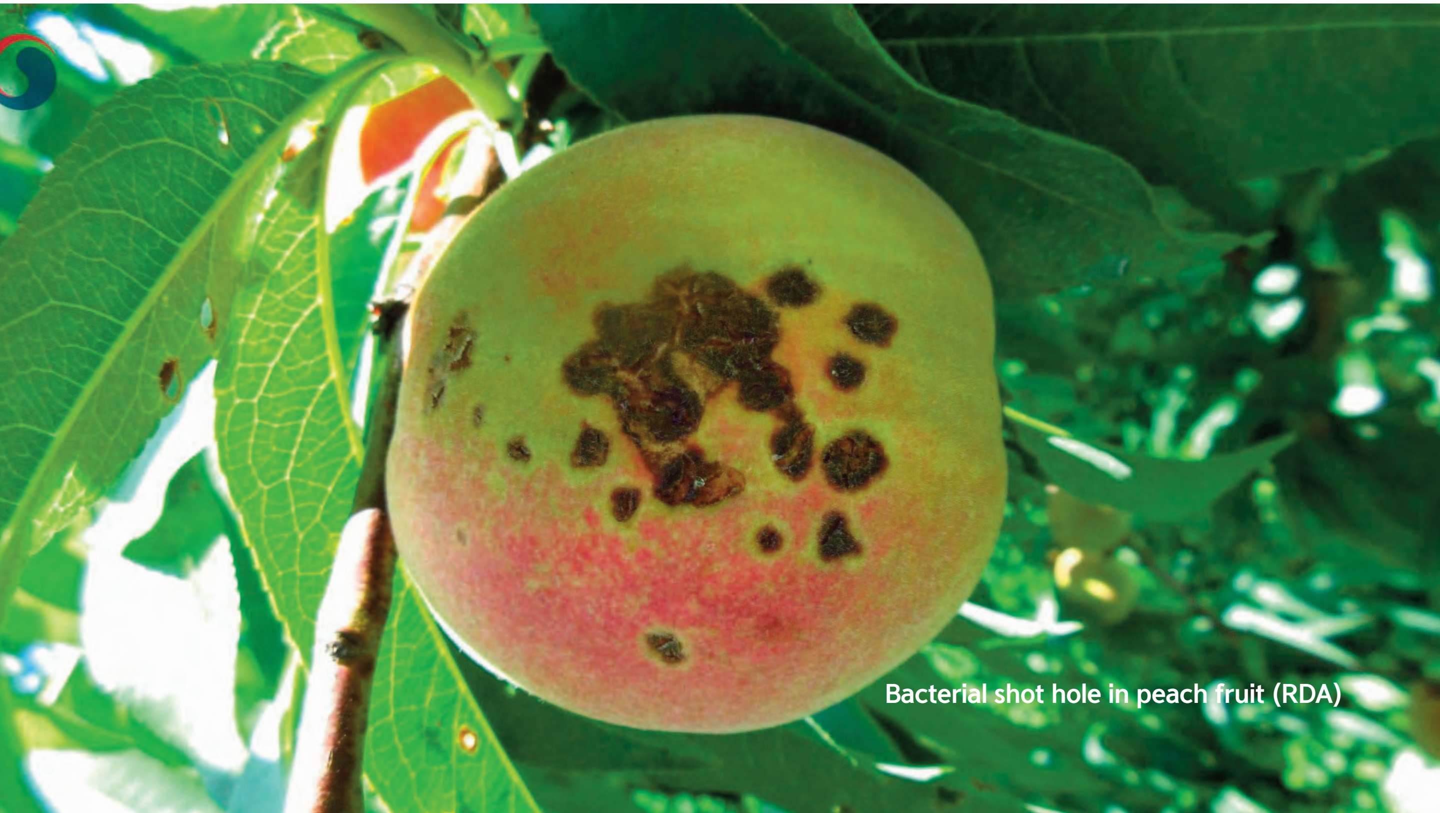
Bacterial shot hole in peach fruit (RDA)



Bacterial shot hole in peach leaf (RDA)



Bacterial shot hole in peach leaf (RDA)



Bacterial shot hole in peach fruit (RDA)

Practical use of JADAM method

JADAM Natural Solutions can be utilized in our daily life. JADAM Sulfur (JS) is used as a germicide, but it is also effective against athlete's feet, and various skin diseases. It is also effective in controlling termites and can work as a repellent for snakes. You can also use JS to increase the shelf life of the fruit.

A natural pesticide mixed with JADAM Sulfur (JS), JADAM Wetting Agent (JWA), and JADAM Herb Solution (JHS) is very effective in controlling mosquitos and getting rid of moles. It also has a powerful effect on fire ants.

How to store fruit

Fruit storage information

Unlike grains, fruits are soft and juicy so after harvesting, the internal state changes a lot. Therefore, preparing to have proper storage is mandatory to avoid internal changes as much as possible. To store fruits better, you need to consider their variety and choose the appropriate storage method. There are two types of storage methods: storing underground and indoor storage.

The stored fruits continue to evaporate. When pathogenic bacteria occur, fruit decomposes easily. This can happen depending on the temperature and humidity during storage and the process of decomposing becomes faster at higher temperatures. Therefore, it is better to store at a low temperature, but if the temperature is too low it might damage the quality of fruits.

Before storing fruits and vegetables, divide them according to quality, cool them down, and then cure. For the perishable vegetables or fruits, using germination inhibitor is recommended. It would help if it is well ventilated while suppressing over-ripening and germination.

The CA (controlled atmosphere storage) storage allows long-term fruit shelf life by adjusting the concentration of carbon dioxide and oxygen in the air. Adjust depending on the variety of fruits and crops. The ideal way to store fruits for a long time is by controlling temperature, humidity, gas composition.

The CA storage system was first commercialized in the USA. Fruit must be sealed and requires an extra carbon dioxide removal device, a ventilation device that can control the oxygen content, an air pressure control device, and a humidity control device. Therefore, it requires a lot of construction costs. In apples, conditions such as temperature, oxygen, and carbon dioxide should be adjusted differently depending on the variety. In the case of Bartlett, it should have different conditions depending on the producing area.

(Doosan Encyclopedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS	200ml		
JWA	200ml		
JHS			
JMS			
NaOH			
Fine soil			
Control interval	1 times	Visible effect	15 days

- JS is sprayed in the box of fruit, not on fruit itself. There is no accurate extension of shelf life, however, It is sure to extend the shelf life.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

Mole

Talpa micrura coreana

Description

Mogera robusta is a species of mammal in the mole family. It lives in China, Korea and Russia. It is treated as a large mole (a subspecies of Japanese mole, Mogera wogura). The body length is 9 to 11 cm, and the length of its tail is 1.2 to 3.5 cm. The shape of its body is cylindrical.

Its hair is soft and straight and color is dark brown. The head and the underside of the body are orange, colored by secretions from the blood glands. The mouth is long and pointed, and its eyes are so small that they are covered with flesh. The mole's teeth are very sharp, and they have 42 of them. As an animal living in the ground, it has a very developed sense of smell and hearing.

Life cycle

Moles can give birth around 2 to 3 years old. They mate around March to April and give birth to 2 to 7 pups once a year. They grow very fast that after 6 months, they grow to the same size as their mother except for the foreleg. Their lifespan is around 5 years.

Moles can tolerate higher levels of carbon dioxide than other mammals. This is because their blood cells have a special form of hemoglobin with a high affinity for oxygen. Also, moles use oxygen more effectively by reusing the air they exhale, and as a result, they can survive in a hypoxic environment.

(wikipedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS	40ml	40ml	
JWA	300ml	300ml	
JHS	500ml	500ml	
JMS			
NaOH			
Fine soil			
Control interval	10 days	**Visible effect**	7 days

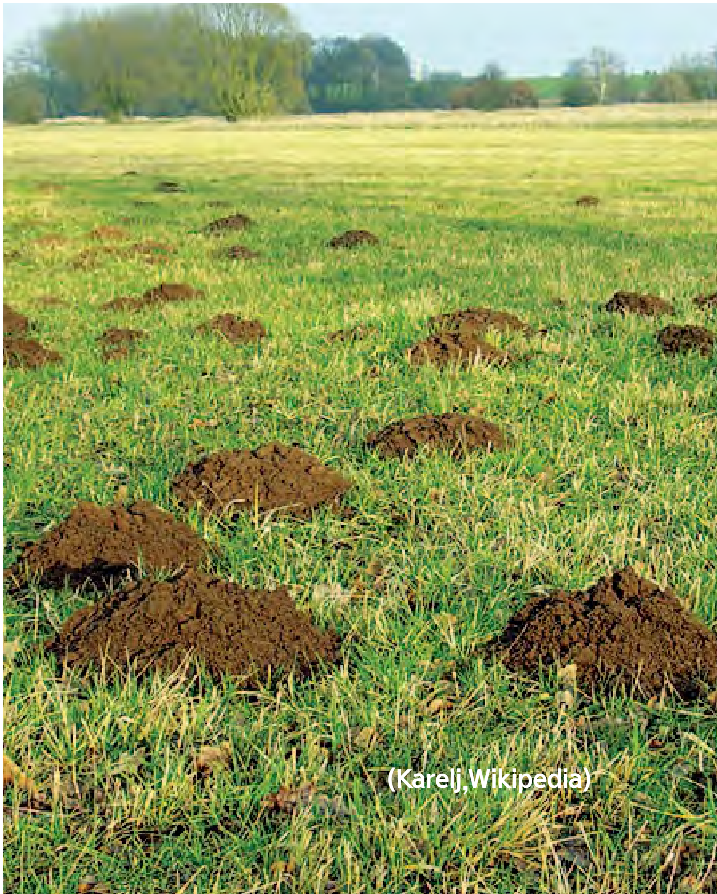
- Continous use of JADAM solution will reduce the number of mole emergence. It is believed to be an effect of Ginko berries JHS and JS.
- This solution can also be used in irrigation before transplanting.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Kenneth Catania, Vanderbilt University, Wikipedia)

(I,Stanislaw Szydlo, Wikipedia)

Garsum Plunger Mole Trap. (Amazon)



(Karelj,Wikipedia)

Mosquito

Culicidae

Life cycle

There are around 3,500 species of mosquito in the world. Like other insects, it consists of three parts: head, thorax and abdomen. The head has a pair of antennae, a pair of compound eyes, a proboscis, and a palps pair. The thorax is divided into prothorax, scutum, and scutellum. Its whole body is covered with scales.

Mosquitoes are complete metamorphic insects. It goes through the life cycle of eggs, larvae, pupae and adults. Eggs are usually laid on water. The forest Mosquito's eggs do not have air bubbles and are scattered individually. The anopheline mosquito has an air bladder on the back of eggs.

It hatches about 3 days after laying eggs on water and becomes a larva. The larva has a clearly distinguished head, thorax and abdomen. The head has a pair of antennae, a pair of compound eyes, and a mouth. Its thorax is divided into 3 parts. Its abdomen has 8 segments, and at the end of the abdomen, there is a cylinder-shaped air-breathing organ, called a siphon. . On the other side, there is an underwater respiratory organ, called a gill. The larvae molt 4 times within 7 days to become a pupa.

Mosquito takes about 13 to 20 days from eggs to adults. The lifespan of an adult is 1 to 2 months. Bloodsucking is limited to female mosquitos, and males suck on plant juice or fruit juice. The female bloodsucking mosquitos lay eggs in 4 to 7 days after it sucks blood once or twice. The reason female mosquitoes suck blood is to get enough protein to lay eggs. In the case of the Culex mosquito, it lives around 72 days and lays eggs 13 times. It lays around 155 eggs at a time.

There are several different ways how female mosquitos find a host to get protein easily. However, it has been reported that it finds the host through carbon dioxide emitted by animals. Therefore, lighting a mosquito fire that causes carbon dioxide gas has the effect of attracting mosquitoes. Using dry ice for mosquito collection is effective. Mosquito's active time for house mosquitoes and anopheline mosquitoes are generally at night, and some of the forest mosquitoes suck blood during the daytime. Bloodsucking activity is dominated by light stimulation, and it starts around 7 p.m. in summer. (wikipedia)

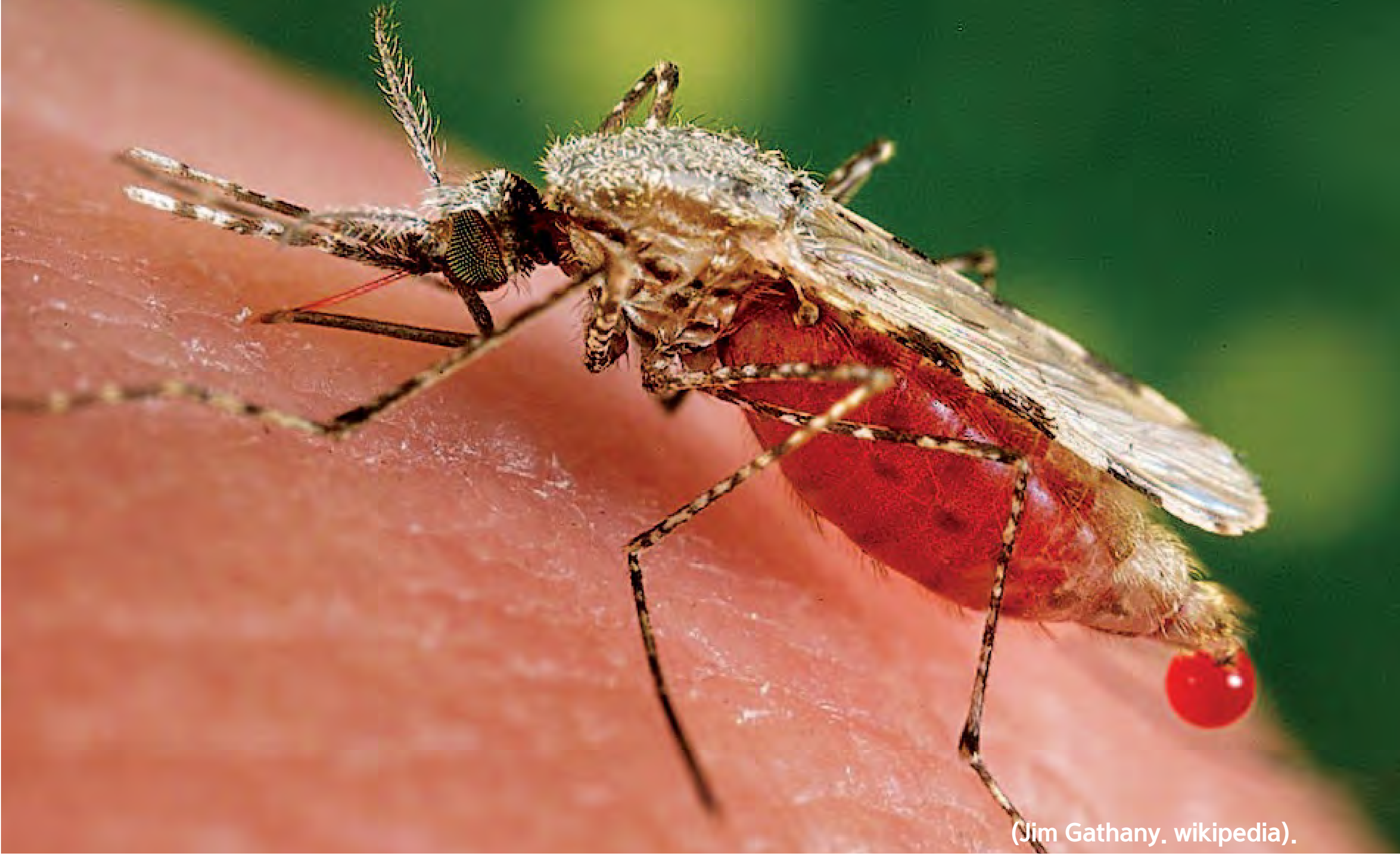
JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA	200ml	300ml	
JHS	400ml	500ml	
JMS			
NaOH			
Fine soil			
Control interval	10 days	**Visible effect**	3~4 days

- Continuos use of JADAM solution certainly disappear mosquitoes in the farm. This phenomenon is believed to be an effect of Ginko berries JHS
- Organic farmers will no longer suffer from a mosquito bite.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz



(Jim Gathany, wikipedia).

(Rkitko, wikipedia)

(Alvesgaspar, wikipedia)

(James Gathany, wikipedia)

Snake

Life cycle

Snakes are distributed all over the world except in the polar regions. There are few species in cold regions, and the number of species increases from temperature regions to tropical regions. There are over 3,000 species in 13 families worldwide.

Snakes have a long body, degenerated limbs and move the body through the movement of scales on the stomach and ribs. The snake's skin is a series of scales made of keratin and there are differences in the shape and number of rags depending on the species, making it a taxonomic feature.

The dorsal surface consists of small scales, and the rear surface is arranged in a row of large scales, but the tail part is in pairs. It molts more than once a year, and if not molting, it keratinizes and dies naturally. When molting, the entire body loses its gloss 2 weeks before, and the transparent film over its eyes becomes translucent. Immediately before shedding the skin, it is shiny again and there is a fat quality between the old and new layers. More remarkably, fine cilia are formed on the new skin inside, and the skin is removed cleanly from the head to the tip of the tail.

Their eyes do not have eyelids, but there is a transparent scale on the front of the eyeball, so tears do not flow to the front, and the eyeball does not move. The pupil of the nocturnal snake is oval. The tongue is thin and long, and it has two ends. When the surrounding environment is different, it moves out of the mouth and flutters. The tongue is very sensitive, and traces of prey (rats or frogs) can be sensed with the tongue to find the place where the prey is hiding.

The skeleton has no limbs but is a unique adaptation, and the anterior jaw, the upper jaw, the lower jaw, the fibula, and the palatine of the two bones are all movable.

(Encyclopedia of Korean National Culture)

JADAM Natural Control Ratio

Refer to pages 25, 35~37

Standard (20L)	Prevention	Infestation	Emergency
JS	40ml	40ml	
JWA	300ml	300ml	
JHS			
JMS			
NaOH			
Fine soil			
Control interval	If necessary	**Visible effect**	7days

- Using JADAM Solution continuously decreases the number of snake appearnce. It is believed to the effect of JADAM Sulfur.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Victorrocha. wikipedia)

(Bree Mc.wikipedia)

(Ian McIntosh.wikipedia.)

(Andreas Eichler.wikipedia)

Fire ant, Ant

Description

Formica yessensis is a species of ants belonging to the genus Fire ants. It is also called hwaui (火蟻). It is distributed in the Korean Peninsula, Japan (North of central Honshu), China, Taiwan and Russia (East Siberia). The body length is 4.5~8mm for a worker ant and 9~12mm for a queen ant. Fire worker ants are very different in body length and size. There are also queen ants with similar body lengths to worker ants. The shape of fire ants is generally similar to Formica japonica of the same genus. The rounded triangular face, compounded eyes, and the queen and male ants uniquely have three ocelluses.

Life cycle

It has a nest differentiated from other ants, it is a grave-type nest made by dry grass and dry coniferous leaves, piled up to the height of an adult's waist. Their activity period is from April to October, and the mating flight takes place around August. (wikipedia)

Refer to pages 25, 35~37

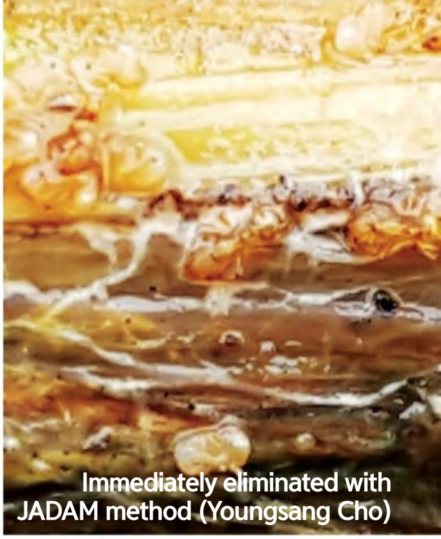
JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS			
JWA		400ml	
JHS			
JMS			
NaOH		40g	
Fine soil			
Control interval	If necessary	**Visible effect**	1 minutes

- Fire ant is easily treatable with JADAM solution. It only takes 1 minute to see the promising result.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

Fire ant (Youngsang Cho)


Immediately eliminated with JADAM method (Youngsang Cho)

(Public Domain, wikipedia)

Immediately eliminated with JADAM method (Youngsang Cho)

Moss/Liverwort

Bryophytes

Description

Bryophytes do not have vascular tissue and live while the gametophyte performs photosynthesis. It has stems, leaves, flat roots, and propagates through spores. Bryophytes grow on land and lives in moist earth, rocks, rotten trees, the trunks of trees, and more. Bryophytes grow from high mountain tops to polar rocks, and many species can be found in tropical rainforests.

It does not reproduce flowers or seeds. Most of the bryophytes are in the form of a lefafy gametophyte in which stems and leaves are differentiated, but they are also found in the form of a thallus in which the leaves and stems are not differentiated, such as liverworts, moss, and hornworts.

Its flat root has almost no absorbing action. It holds onto other objects or supporting the stems. Although it is called bryophytes by tying together liverworts, mosses and hornworts, it is an unofficial name. It is a paraphyletic group without synapomorphy. However, each liverwort, moss and hornwort are a monophyletic group.

One characteristic of mosses is that the leaves have a costa and the capsules usually have an operculum. There are stoma or columella, no elater and capsule, and seta are maintained for a long time. Liverworts have no costa on leaves, and develop an air chamber and oily-body.

There is elater inside the capsule, and there is no peristome and operculum in the capsule. Seta is distinguished from mosses by a trait that the seta melts after 2-3 days. (wikipedia)

JADAM Natural Control Ratio

Refer to pages 25, 35~37

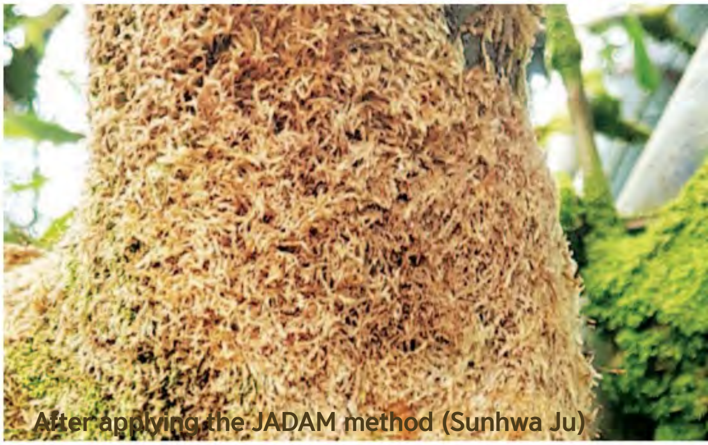
Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	
JWA		400ml	
JHS			
JMS			
NaOH			
Fine soil			
Control interval	If necessary	**Visible effect**	7 days

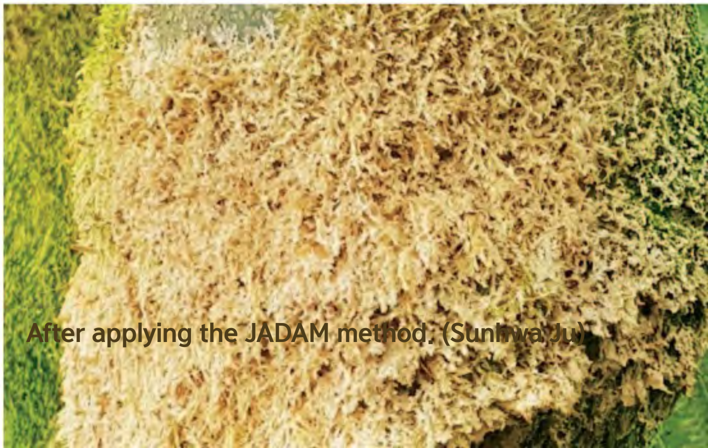
- When using JADAM Solution, Moss will discolor and fall off the tree.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Youngsang Cho)

(Sunhwa Ju)


After applying the JADAM method (Sunhwa Ju)


After applying the JADAM method. (Sunhwa Ju)

Green marks

Description

Excessive amount of fertilizers and nutrient can cause green marks on a tree. It can impede the growth of crops and reduce the sugar content and quality.

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		40ml	
JWA		400ml	
JHS			
JMS			
NaOH			
Fine soil			
Control interval	If necessary	**Visible effect**	2~3days

- It will appear clean after few days.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

Termite

Coptotermes formosanus

Description

Its nest is located under the ground or inside of wood. It also has a nest on the surface of the ground which is called a termite nest. It is often found in a region not limited to India, Africa, and Australia.There are many different sizes and shapes of the nest. The tallest one is around 6m and 3.5m in diameter. The contents of the nests are rock, bedrock, stick, mushroom and so on. Termites solidifies the soil, sand, and plant fragments with its saliva and discharge to make the tunnels and rooms underground. There is a maze-like passage inside, royal cell, and nursery galleries in the center. There are also air channels. There are beetles in termite nest as in ant nests and there are other insects in the nest which have symbiotic relations with termites.

Life Cycle

In the termite hill, there is another class called a secondary queen. It has short degenerated wings and degenerated eyes. Secondary queens can reproduce in place of queen termites and king termites but they have low fertility. When a queen termite dies, there are many cases where one or several appear on the queen's back. There are also female soldiers and worker termites but female workers and solider termites cannot lay eggs. Their lifespan is 2 to 4 years. Also, many do not have eyes. Worker termites do the work of feeding, cleaning, and repair and solider termites protect the nest against external enemies. There are two different soldier termites. One has a large jaw and another has a small jaw and its frontal lobes are shaped as an elongated snout. Those with small jaws defend external enemies by secreting special liquids through its postpharyngeal gland on its frontal lobes.

Excluding cold regions, termites are widely distributed all over the world but mainly they are in subtropical and tropical regions. 2,050 species are known in the world, and over 500 species are distributed in Africa. Many termites in temperate regions live underground, and in some cases, it lives in dead trees, cut stumps or lumber. There are cases that they cause serious damage to wooden buildings.

(Doosan Encyclopedia)

Refer to pages 25, 35~37

JADAM Natural Control Ratio

Standard (20L)	Prevention	Infestation	Emergency
JS		1000ml	
JWA		500ml	
JHS			
JMS			
NaOH			
Fine soil			
Control interval	If necessary	**Visible effect**	7 days

- JADAM Solution can be injected or sprayed.
- Treating with JADAM Solution once can have long-term effect.

20L = 5.3gal, 15L ≈ 4gal, 100g=3.5oz

(Scott Bauer. wikipedia)

(Alton. wikpedia)

(Lady alys. wikimedia)

(Sanjay Acharya.wikipedia)

자담에 '매월 후원'하여
주시는 분들
강원지역
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The establishment of the JADAM system in 1991
was possible to step by step with our donors' consistency and great support.
People who sympathized with JADAM's philosophy
and technology started donation in 2003.

JADAM has engraved all the donor's names on a wooden plate
on the JADAM Daejeon Education Center wall as a token of appreciation.

Only with passion for farmers and agriculture
for the advancement of Ultra-Low-Cost organic farming technology
being able to walk one path without any commercial compromise
was possible with the greatest support.

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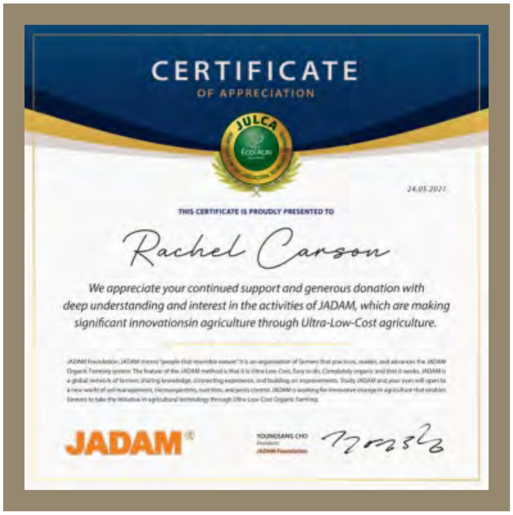
(http://en.jadam.kr/com/supportList.php)



CERTIFICATE
OF APPRECIATION

24.05.2021

THIS CERTIFICATE IS PROUDLY PRESENTED TO

Rachel Carson

We appreciate your continued support and generous donation with deep understanding and interest in the activities of JADAM, which are making significant innovationsin agriculture through Ultra-Low-Cost agriculture.

JADAM®

YOUNGSANG CHO
President
JADAM Foundation

Search by Common Name

Italics type is scientific names.

1. *Adelphocoris suturalis*	*Adelphocoris suturalis*	198
2. *Aguriahana triangularis*	*Aguriahana triangularis*	276
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4. *Amblyseius californicus*	*Amblyseius californicus*	370
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6. *Anoplocnemis dallasi*	*Anoplocnemis dallasi*	202
7. Anthracnose	*Colletotrichum coccodes*	444
8. *Aphelinus mali*	*Aphelinus mali*	368
9. *Aphelinus varipes*	*Aphelinus varipes*	364
10. Aphid midge	*Aphidoletes aphidimyza*	384
11. *Aphidius colemani*	*Aphidius colemani*	390
12. *Aphidius gifuensis*	*Aphidius gifuensis*	372
13. *Aphis egomae*	*Aphis egomae*	96
14. Apple blossom weevil	*Anthonomus pomorum*	338
15. Apple leafminer	*Phyllonorycter ringoniell*	242
16. Arrowhead scale	*Unaspis yanonensis*	188
17. *Asiacornococcus kaki*	*Asiacornococcus kaki*	178
18. Asian corn borer	*Ostrinia furnacalis*	252
19. Asian yellow swallowtail	*Papilio xuthus*	352
20. Asiatic onion leafminer	*Acrolepiopsis sapporensis*	260
21. Bacterial canker	*Xanthomonas campestris*	402
22. Bacterial shot hole	*Xanthomonas campestris pv*	450
23. Bacterial soft rot	*Erwinia carotovora subsp*	420
24. Bacterial spot	*Xanthomonas campestris*	426
25. Bakanae disease	*Gibberella fujikuroi*	442
26. *Basilepta fulvipes*	*Basilepta fulvipes*	308
27. Bean bug	*Riptortus clavatus*	204
28. Bean pod borer	*Maruca vitrata*	256
29. Bean tussock moth	*Cifuna locuples*	254

30. Beet armyworm	*Spodoptera exigua*	258
31. Beet webworm moth	*Hymenia recurvalis*	268
32. *Betasyrphus serarius*	*Betasyrphus serarius*	356
33. Black spot	*Phoma citricarpa var*	396
34. Black spot (Banana)	*Black sigatoka*	398
35. Black spot (Papaya)	*Asperisporium caricae*	400
36. Blast	*Magneporthe oryzae*	416
37. Blue alfalfa aphid	*Acyrthosiphon kondoi*	140
38. Blue oat mite	*Penthaleus major*	74
39. Brown mite	*Bryobia rubrioculus*	80
40. Brown planthopper	*Nilaparvata lugens*	282
41. Brown tail moth	*Euproctis chrysorrhoea*	266
42. Bulb mite	*Rhizoglyphus*	76
43. Cabbage aphid	*Brevicoryne brassicae*	124
44. Cabbage moth	*Mamestra brassicae*	222
45. Cabbage webworm	*Hellula undalis*	232
46. Cabbage white butterfly	*Pieris rapae*	236
47. Cabbage whitefly	*Aleyrodes proletella*	156
48. Cedar apple rust	*Gymnosporangium asiaticum*	448
49. Chestnut aphid	*Myzocallis kuricola*	106
50. Chrysanthemum aphid	*Macrosiphoniella sanborni*	88
51. Chrysanthemum gall midge	*Diarthronomyia chrysanthemi*	294
52. Chrysanthemum lace bug	*Corythucha marmorata*	306
53. *Chrysolina aurichalcea*	*Chrysolina aurichalcea*	316
54. Citrus flatid planthopper	*Metcalfa pruinosa*	310
55. Citrus leafminer	*Phyllocnistis citrella*	212
56. Citrus red mite	*Panonychus citri*	72
57. Clubroot	*Plasmodiophora brassicae*	424
58. Coffee berry bore(CBB)	*Hypothenemus hampei*	346
59. Coffee scale, Green scale	*Coccus viridis*	186
60. Common apple leafroller moth	*Hoshinoa longicellana*	244
61. Corn leaf aphid	*Rhopalosiphum maidis*	126
62. Cotton bollworm	*Helicoverpa armigera*	250

63. Cotton caterpillar	*Diaphania indica*	228
64. Cottony cushion scale	*Icerya purchasi*	182
65. Cowpea aphid	*Aphis craccivora*	122
66. Curcubit beetle	*Aulacophora indica*	322
67. Daikon Leaf Beetle	*Phaedon brassicae*	326
68. Damping-off	*Pythium ultimum*	438
69. Diamondback moth	*Plutella xylostella*	234
70. *Diglyphus isaea*	*Diglyphus isaea*	358
71. Downy mildew	*Pseudoperonospora cubensis*	410
72. English grain aphid	*Sitobion avenae*	112
73. *Eriophyes kuko kishida*	*Eriophyes kuko kishida*	70
74. European red mite	*Panonychus ulmi*	78
75. *Eurytomoa maslovskii*	*Eurytomoa maslovskii*	342
76. Fall webworm	*Hyphantria cunea*	230
77. Fire ant, Ant	Fire ant, Ant	462
78. *Frankliniella intonsa*	*Frankliniella intonsa*	164
79. Fusarium wilt	*Fusarium oxysporum*	428
80. Garden pea leaf miner	*Chromatomya horticola*	298
81. Garden springtail	*Bourletiella hortensis*	334
82. Grain aphid	*Sitobion avenae*	90
83. Grape leafhopper	*Arboridia kakogawana*	286
84. Gray mold	*Botrytis cinerea*	440
85. Great chestnut aphid	*Lachnus tropicalis*	108
86. Green marks	Green marks	466
87. Green peach aphid	*Myzus persicae*	116
88. Greenhouse whitefly	*Trialeurodes vaporariorum*	154
89. *Greenidea nipponica*	*Greenidea nipponica*	138
90. Hemispherical scale	*Saissetia coffeae*	184
91. Hoverfly	*Allograpta balteata*	392
92. Insidious flower bug	*Orius laevigatus*	366
93. Japanese beetle	*Popillia japonica*	324
94. Japanese butterbur aphid	*Aphis fukii*	98
95. Japanese wax scale	*Ceroplastes japonicus*	180

96. Jujube leafroller	*Ancylis sativa*	220
97. Jumping plant louse	*Bactericera gobica*	146
98. Kuwana pear aphid	*Prociphilus kuwanai*	110
99. Leaf blight	*Heterosporium allii*	434
100. Leaf curl	*Taphrina deformans*	436
101. Leaf curling aphid	*Myzus malisuctus*	120
102. Leaf miner	*Liriomyza trifolii*	296
103. Leaf mold	*Passalora fulva*	432
104. Legume stink bug	*Piezodorus hybneri*	192
105. *Lema decempunctata*	*Lema decempunctata*	318
106. Lettuce shark	*Cucullia fraterna*	226
107. *Lissorhoptrus oryzophilus*	*Lissorhoptrus oryzophilus*	340
108. Mealy plum aphid	*Hyalopterus pruni*	114
109. Melon aphid, Cotton aphid	*Aphis gossypii*	100
110. Melon thrips	*Thrips palmi*	170
111. Mole	*Talpa micrura coreana*	456
112. Monema	*Monema flavescens*	214
113. Mosaic virus	Mosaic virus	418
114. Mosquito	*Culicidae*	458
115. Moss	Moss	464
116. Mulberry mealybug	*Pseudococcus comstocki*	176
117. Mulberry psyllid	*Anomoneura mori*	152
118. Mulberry thrips	*Pseudodendrothrips mori*	168
119. *Neoseiulus cucumeris*	*Neoseiulus cucumeris*	378
120. Old world swallowtail	*Papilio machaon*	344
121. Oleander aphid	*Aphis nerii*	104
122. Onion aphid	*Neotoxoptera formosana*	142
123. Onion maggot	*Delia antiqua*	292
124. Onion miner	*Liriomyza chinensis*	302
125. Onion Thrips	*Thrips tabaci*	172
126. Oriental tobacco budworm	*Helicoverpa assulta*	218
127. Papaya mealybug	*Paracoccus marginatus*	350
128. Pea aphid	*Acyrthosiphon pisum*	128

129. Peach fruit moth	*Carposina sasakii*	240
130. Pear lace bug	*Stephanitis nashi*	312
131. Pear sucker	*Psylla pyricola*	148
132. Persimmon fruit moth	*Stathmopoda masinissa*	208
133. Phytophthora blight	*Phytophthora nicotianae*	430
134. *Phytoseiulus persimilis*	*Phytoseiulus persimilis*	386
135. Pill bugs	*Armadillidium vulgare*	332
136. Plum leafroller	*Rhopobota naevana*	224
137. *Pochazia shantungensis*	*Pochazia shantungensis*	272
138. *Ponticulothrips diospyrosi*	*Ponticulothrips diospyrosi*	160
139. Powdery mildew	*Leveillula taurica*	446
140. Predatory gall midge	*Feltiella acarisuga*	382
141. Red spot black lady beetle	*Chilocorus kuwanae*	376
142. Rice black bug	*Scotinophara lurida*	196
143. Rice green leafhopper	*Nephotettix cincticeps*	278
144. Rice leaf roller	*Cnaphalocrocis medinalis*	262
145. Rose aphid	*Sitobion ibarae*	132
146. Rust	*Puccinia jogashimensis*	412
147. Scab	*Elsinoe fawcettii*	414
148. Sclerotinia rot	*Sclerotinia sclerotiorum*	404
149. Seven spotted lady beetle	*Coccinella septempunctata*	388
150. Siprea Aphid	*Aphis spiraecola*	130
151. Small brown planthopper	*Laodelphax striatellus*	284
152. Smut	*Ustilaginomycetes*	408
153. Snails, Slugs	Snails, Slugs	336
154. Snake	Snake	460
155. Soil nematode	Soil nematode	348
156. Sooty blotch	*Capnophaeum fuliginodes*	406
157. Soybean aphid	*Aphis glycines*	136
158. Spider mite destroyer	*Stethorus punctillum*	362
159. Spotted lanternfly	*Lycorma delicatula*	280
160. Spotted wing drosophila	*Drosophila suzukii*	300
161. Striped cucumber beetle	*Acalymma vittatum*	320

162. Striped flea beetle	*Phyllotreta striolata*	314
163. Summer fruit tortrix moth	*Adoxophyes orana*	246
164. Sweetpotato whitefly	*Bemisia tabaci*	150
165. Tea red spider mite	*Oligonychus coffeae*	84
166. Termite	*Coptotermes formosanus*	468
167. Thirteenspotted lady beetle	*Hippodamia tredecimpunc tata*	374
168. Tobacco cutworm, Cut worm	*Spodoptera litura*	216
169. Turnip aphid	*Lipaphis pseudobrassicae*	102
170. Twirler moth	*Gelechiidae*	210
171. Twospotted spider mite	*Tetranychus urticae*	82
172. *Udonomeiga vicinalis*	*Udonomeiga vicinalis*	248
173. Uroleucon aphid	*Uroleucon formosanum*	94
174. *Uroleucon fuchuense*	*Uroleucon fuchuense*	134
175. Valsa canker	*Valsa ceratosperma*	422
176. *Velinus nodipes*	*Velinus nodipes*	360
177. Vetch aphid	*Megoura viciae*	92
178. Western flower thrips	*Frankliniella occidentalis*	162
179. White backed rice planthopper	*Sogatella furcifera*	288
180. Whitefly Parasite	*Encarsia formosa*	380
181. Winter cherry bug	*Acanthocoris sordidus*	194
182. Wooly apple aphid	*Eriosoma lanigerum*	118
183. Yellow brown stink bug	*Halyomorpha halys*	200
184. Yellow peach moth	*Conogethes punctiferalis*	238
185. Yellow tea thrips	*Scirtothrips dorsalis*	166
186. *Zorka sp*	*Zorka sp*	274

Search by Scientific Name

Italics type is scientific names.

1. *Acalymma vittatum*	Striped cucumber beetle	320
2. *Acanthocoris sordidus*	Winter cherry bug	194
3. *Acrolepiopsis sapporensis*	Asiatic onion leafminer	260
4. *Acyrthosiphon kondoi*	Blue alfalfa aphid	140
5. *Acyrthosiphon pisum*	Pea aphid	128
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52. *Coccinella septempunctata*	Seven spotted lady beetle	388
53. *Coccus viridis*	Coffee scale, Green scale	186
54. *Coleosporiaceae*	Rust	412
55. *Colletotrichum coccodes*	Anthracnose	444
56. *Conogethes punctiferalis*	Yellow peach moth	238
57. *Coptotermes formosanus*	Termite	468
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69. *Eriosoma lanigerum*	Wooly apple aphid	118
70. *Erwinia carotovora subsp*	Bacterial soft rot	420
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72. *Eurytomoa maslovskii*	Eurytomoa maslovskii	342
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78. *Gelechiidae*	Twirler moth	210
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80. Green marks	Green marks	466
81. *Greenidea nipponica*	*Greenidea nipponica*	138
82. *Gymnosporangium asiaticum*	Cedar apple rust	448
83. *Halyomorpha halys*	Yellow brown stink bug	200
84. *Helicoverpa armigera*	Cotton bollworm	250
85. *Helicoverpa assulta*	Oriental tobacco budworm	218
86. *Hellula undalis*	Cabbage webworm	232
87. *Heterosporium allii*	Leaf blight	434
88. *Hippodamia tredecimpunc tata*	Thirteenspotted lady beetle	374
89. *Hoshinoa longicellana*	Common apple leafroller moth	244
90. *Hyalopterus pruni*	Mealy plum aphid	114
91. *Hymenia recurvalis*	Beet webworm moth	268
92. *Hyphantria cunea*	Fall webworm	230
93. *Hypothenemus hampei*	Coffee berry bore(CBB)	346
94. *Icerya purchasi*	Cottony cushion scale	182
95. *Lachnus tropicalis*	Great chestnut aphid	108

96. *Laodelphax striatellus*	Small brown planthopper	284
97. *Lema decempunctata*	*Lema decempunctata*	318
98. *Leveillula taurica*	Powdery mildew	446
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106. *Mamestra brassicae*	Cabbage moth	222
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114. *Myzus malisuctus*	Leaf curling aphid	120
115. *Myzus persicae*	Green peach aphid	116
116. *Neoseiulus cucumeris*	*Neoseiulus cucumeris*	378
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119. *Nilaparvata lugens*	Brown planthopper	282
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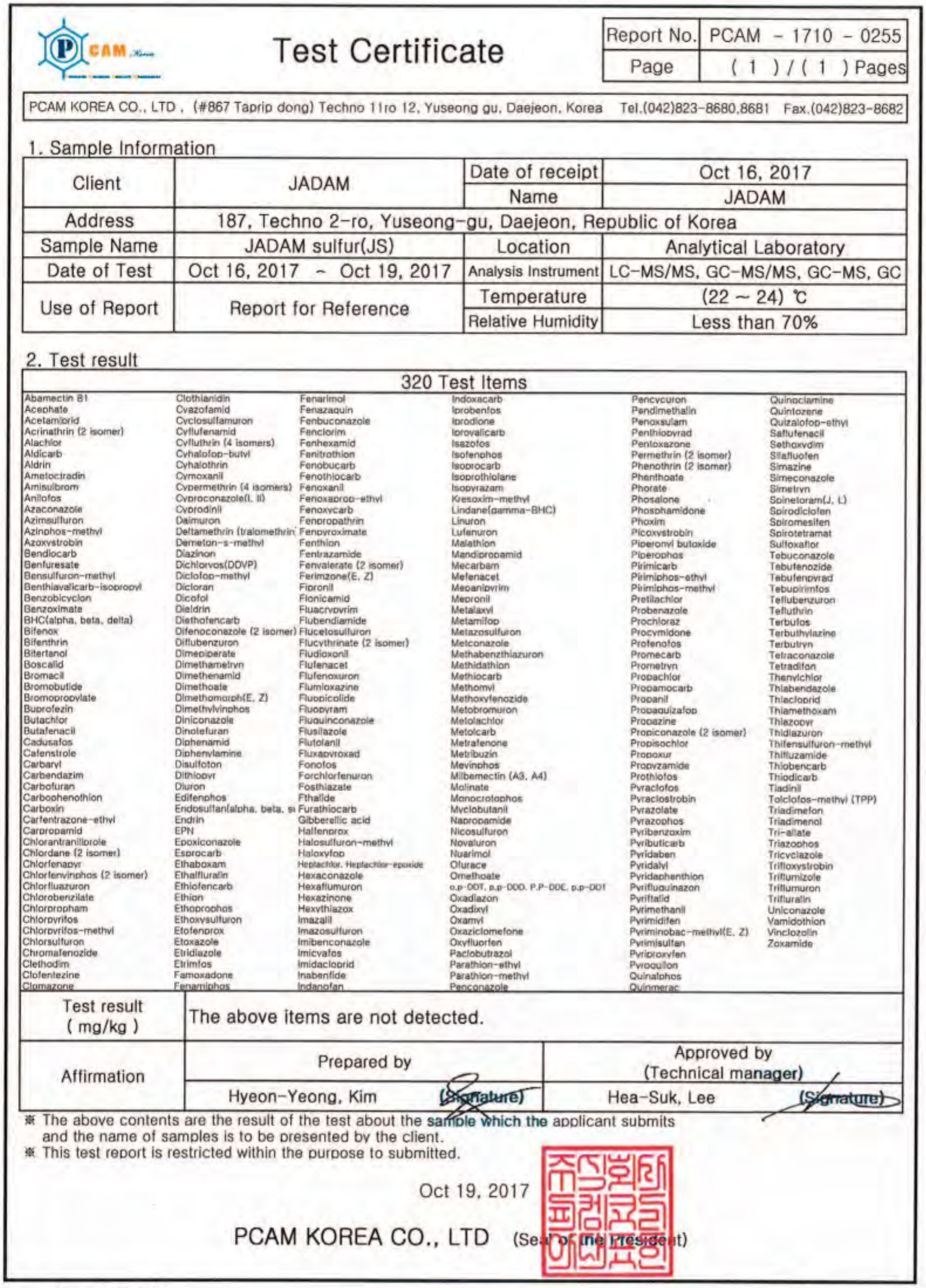
123. *Panonychus citri*	Citrus red mite	72
124. *Panonychus ulmi*	European red mite	78
125. *Papilio machaon*	Old world swallowtail	344
126. *Papilio xuthus*	Asian yellow swallowtail	352
127. *Paracoccus marginatus*	Papaya mealybug	350
128. *Passalora fulva*	Leaf mold	432

129. *Penthaleus major*	Blue oat mite	74
130. *Phaedon brassicae*	Daikon Leaf Beetle	326
131. *Phoma citricarpa var*	Black spot	396
132. *Phyllocnistis citrella*	Citrus leafminer	212
133. *Phyllonorycter ringoniell*	Apple leafminer	242
134. *Phyllotreta striolata*	Striped flea beetle	314
135. *Phytophthora nicotianae*	Phytophthora blight	430
136. *Phytoseiulus persimilis*	*Phytoseiulus persimilis*	386
137. *Pieris rapae*	Cabbage white butterfly	236
138. *Piezodorus hybneri*	Legume stink bug	192
139. *Plasmodiophora brassicae*	Clubroot	424
140. *Plutella xylostella*	Diamondback moth	234
141. *Pochazia shantungensis*	*Pochazia shantungensis*	272
142. *Ponticulothrips diospyrosi*	*Ponticulothrips diospyrosi*	160
143. *Popillia japonica*	Japanese beetle	324
144. *Prociphilus kuwanai*	Kuwana pear aphid	110
145. *Pseudococcus comstocki*	Mulberry mealybug	176
146. *Pseudodendrothrips mori*	Mulberry thrips	168
147. *Pseudoperonospora cubensis*	Downy mildew	410
148. P*sylla pyricola*	Pear sucker	148
149. *Rhizoctonia solani*	Damping-off	438
150. *Rhizoglyphus*	Bulb mite	76
151. *Rhopalosiphum maidis*	Corn leaf aphid	126
152. *Rhopobota naevana*	Plum leafroller	224
153. *Riptortus clavatus*	Bean bug	204
154. *Saissetia coffeae*	Hemispherical scale	184
155. *Scirtothrips dorsalis*	Yellow tea thrips	166
156. *Sclerotinia sclerotiorum*	Sclerotinia rot	404
157. *Scotinophara lurida*	Rice black bug	196
158. *Sitobion avenae*	English grain aphid	112
159. *Sitobion avenae*	Grain aphid	90
160. *Sitobion ibarae*	Rose aphid	132
161. Snails, Slugs	Snails, Slugs	336

162. Snake	Snake	460
163. *Sogatella furcifera*	White backed rice planthopper	288
164. Soil nematode	Soil nematode	348
165. *Spodoptera exigua*	Beet armyworm	258
166. *Spodoptera litura*	Tobacco cutworm, Cut worm	216
167. *Stathmopoda masinissa*	Persimmon fruit moth	208
168. *Stephanitis nashi*	Pear lace bug	312
169. *Stethorus punctillum*	Spider mite destroyer	362
170. *Talpa micrura coreana*	Mole	456
171. *Taphrina deformans*	Leaf curl	436
172. *Tetranychus urticae*	Twospotted spider mite	82
173. *Thrips palmi*	Melon thrips	170
174. *Thrips tabaci*	Onion Thrips	172
175. *Trialeurodes vaporariorum*	Greenhouse whitefly	154
176. *Udonomeiga vicinalis*	*Udonomeiga vicinalis*	248
177. *Unaspis yanonensis*	Arrowhead scale	188
178. *Uroleucon formosanum*	Uroleucon aphid	94
179. *Uroleucon fuchuense*	*Uroleucon fuchuense*	134
180. *Ustilaginomycetes*	Smut	408
181. *Valsa ceratosperma*	Valsa canker	422
182. *Velinus nodipes*	*Velinus nodipes*	360
183. *Xanthomonas campestris*	Bacterial canker	402
184. *Xanthomonas campestris*	Bacterial spot	426
185. Xanthomonas campestris pv	Bacterial shot hole	450
186. *Zorka sp*	*Zorka sp*	274

JS and JWA pesticide residue analysis table (320 components not detected)



Test Certificate

Report No.	PCAM – 1710 – 0255
Page	(1) / (1) Pages

PCAM KOREA CO., LTD , (#867 Taprip dong) Techno 11ro 12, Yuseong gu, Daejeon, Korea Tel.(042)823-8680,8681 Fax.(042)823-8682

1. Sample Information

Client	JADAM	Date of receipt	Oct 16, 2017
		Name	JADAM
Address	187, Techno 2-ro, Yuseong-gu, Daejeon, Republic of Korea		
Sample Name	JADAM sulfur(JS)	Location	Analytical Laboratory
Date of Test	Oct 16, 2017 ~ Oct 19, 2017	Analysis Instrument	LC-MS/MS, GC-MS/MS, GC-MS, GC
Use of Report	Report for Reference	Temperature	(22 ~ 24) ℃
		Relative Humidity	Less than 70%

2. Test result

320 Test Items

Abamectin B1
Acephate
Acetamiprid
Acrinathrin (2 isomer)
Alachlor
Aldicarb
Aldrin
Ametoctradin
Amisulbrom
Anilofos
Azaconazole
Azimsulfuron
Azinphos-methyl
Azoxystrobin
Bendiocarb
Benfuresate
Bensulfuron-methyl
Benthiavalicarb-isopropyl
Benzobicyclon
Benzoximate
BHC(alpha, beta, delta)
Bifenox
Bifenthrin
Bitertanol
Boscalid
Bromacil
Bromobutide
Bromopropylate
Buprofezin
Butachlor
Butafenacil
Cadusafos
Cafenstrole
Carbaryl
Carbendazim
Carbofuran
Carbophenothion
Carboxin
Carfentrazone-ethyl
Carpropamid
Chlorantraniliprole
Chlordane (2 isomer)
Chlorfenapyr
Chlorfenvinphos (2 isomer)
Chlorfluazuron
Chlorobenzilate
Chlorpropham
Chlorpyrifos
Chlorpyrifos-methyl
Chlorsulfuron
Chromafenozide
Clethodim
Clofentezine
Clomazone
Clothianidin
Cyazofamid
Cyclosulfamuron
Cyflufenamid
Cyfluthrin (4 isomers)
Cyhalofop-butyl
Cyhalothrin
Cymoxanil
Cypermethrin (4 isomers)
Cyproconazole(I, II)
Cyprodinil
Daimuron
Deltamethrin (tralomethrin
Demeton-s-methyl
Diazinon
Dichlorvos(DDVP)
Diclofop-methyl
Dicloran
Dicofol
Dieldrin
Diethofencarb
Difenoconazole (2 isomer)
Diflubenzuron
Dimepiperate
Dimethametryn
Dimethenamid
Dimethoate
Dimethomorph(E, Z)
Dimethylvinphos
Diniconazole
Dinotefuran
Diphenamid
Diphenylamine
Disulfoton
Dithiopyr
Diuron
Edifenphos
Endosulfan(alpha, beta, s
Endrin
EPN
Epoxiconazole
Esprocarb
Ethaboxam
Ethalfluralin
Ethiofencarb
Ethion
Ethoprophos
Ethoxysulfuron
Etofenprox
Etoxazole
Etridiazole
Etrimfos
Famoxadone
Fenamiphos
Fenarimol
Fenazaquin
Fenbuconazole
Fenclorim
Fenhexamid
Fenitrothion
Fenobucarb
Fenothiocarb
Fenoxanil
Fenoxaprop-ethyl
Fenoxycarb
Fenpropathrin
Fenpyroximate
Fenthion
Fentrazamide
Fenvalerate (2 isomer)
Ferimzone(E, Z)
Fipronil
Flonicamid
Fluacrypyrim
Flubendiamide
Flucetosulfuron
Flucythrinate (2 isomer)
Fludioxonil
Flufenacet
Flufenoxuron
Flumioxazine
Fluopicolide
Fluopyram
Fluquinconazole
Flusilazole
Flutolanil
Fluxapyroxad
Fonofos
Forchlorfenuron
Fosthiazate
Fthalide
Furathiocarb
Gibberellic acid
Halfenprox
Halosulfuron-methyl
Haloxyfop
Heptachlor, Heptachlor-epoxide
Hexaconazole
Hexaflumuron
Hexazinone
Hexythiazox
Imazalil
Imazosulfuron
Imibenconazole
Imicyafos
Imidacloprid
Inabenfide
Indanofan
Indoxacarb
Iprobenfos
Iprodione
Iprovalicarb
Isazofos
Isofenphos
Isoprocarb
Isoprothiolane
Isopyrazam
Kresoxim-methyl
Lindane(gamma-BHC)
Linuron
Lufenuron
Malathion
Mandipropamid
Mecarbam
Mefenacet
Mepanipyrim
Mepronil
Metalaxyl
Metamifop
Metazosulfuron
Metconazole
Methabenzthiazuron
Methidathion
Methiocarb
Methomyl
Methoxyfenozide
Metobromuron
Metolachlor
Metolcarb
Metrafenone
Metribuzin
Mevinphos
Milbemectin (A3, A4)
Molinate
Monocrotophos
Myclobutanil
Napropamide
Nicosulfuron
Novaluron
Nuarimol
Ofurace
Omethoate
o,p-DDT, p,p-DDD, P,P-DDE, p,p-DDT
Oxadiazon
Oxadixyl
Oxamyl
Oxaziclomefone
Oxyfluorfen
Paclobutrazol
Parathion-ethyl
Parathion-methyl
Penconazole
Pencycuron
Pendimethalin
Penoxsulam
Penthiopyrad
Pentoxazone
Permethrin (2 isomer)
Phenothrin (2 isomer)
Phenthoate
Phorate
Phosalone
Phosphamidone
Phoxim
Picoxystrobin
Piperonyl butoxide
Piperophos
Pirimicarb
Pirimiphos-ethyl
Pirimiphos-methyl
Pretilachlor
Probenazole
Prochloraz
Procymidone
Profenofos
Promecarb
Prometryn
Propachlor
Propamocarb
Propanil
Propaquizafop
Propazine
Propiconazole (2 isomer)
Propisochlor
Propoxur
Propyzamide
Prothiofos
Pyraclofos
Pyraclostrobin
Pyrazolate
Pyrazophos
Pyribenzoxim
Pyributicarb
Pyridaben
Pyridalyl
Pyridaphenthion
Pyrifluquinazon
Pyriftalid
Pyrimethanil
Pyrimidifen
Pyriminobac-methyl(E, Z)
Pyrimisulfan
Pyriproxyfen
Pyroquilon
Quinalphos
Quinmerac
Quinoclamine
Quintozene
Quizalofop-ethyl
Saflufenacil
Sethoxydim
Silafluofen
Simazine
Simeconazole
Simetryn
Spinetoram(J, L)
Spirodiclofen
Spiromesifen
Spirotetramat
Sulfoxaflor
Tebuconazole
Tebufenozide
Tebufenpyrad
Tebupirimfos
Teflubenzuron
Tefluthrin
Terbufos
Terbuthylazine
Terbutryn
Tetraconazole
Tetradifon
Thenylchlor
Thiabendazole
Thiacloprid
Thiamethoxam
Thiazopyr
Thidiazuron
Thifensulfuron-methyl
Thifluzamide
Thiobencarb
Thiodicarb
Tiadinil
Tolclofos-methyl (TPP)
Triadimefon
Triadimenol
Tri-allate
Triazophos
Tricyclazole
Trifloxystrobin
Triflumizole
Triflumuron
Trifluralin
Uniconazole
Vamidothion
Vinclozolin
Zoxamide

Test result (mg/kg)	The above items are not detected.	
Affirmation	Prepared by	Approved by (Technical manager)
	Hyeon-Yeong, Kim (Signature)	Hea-Suk, Lee (Signature)

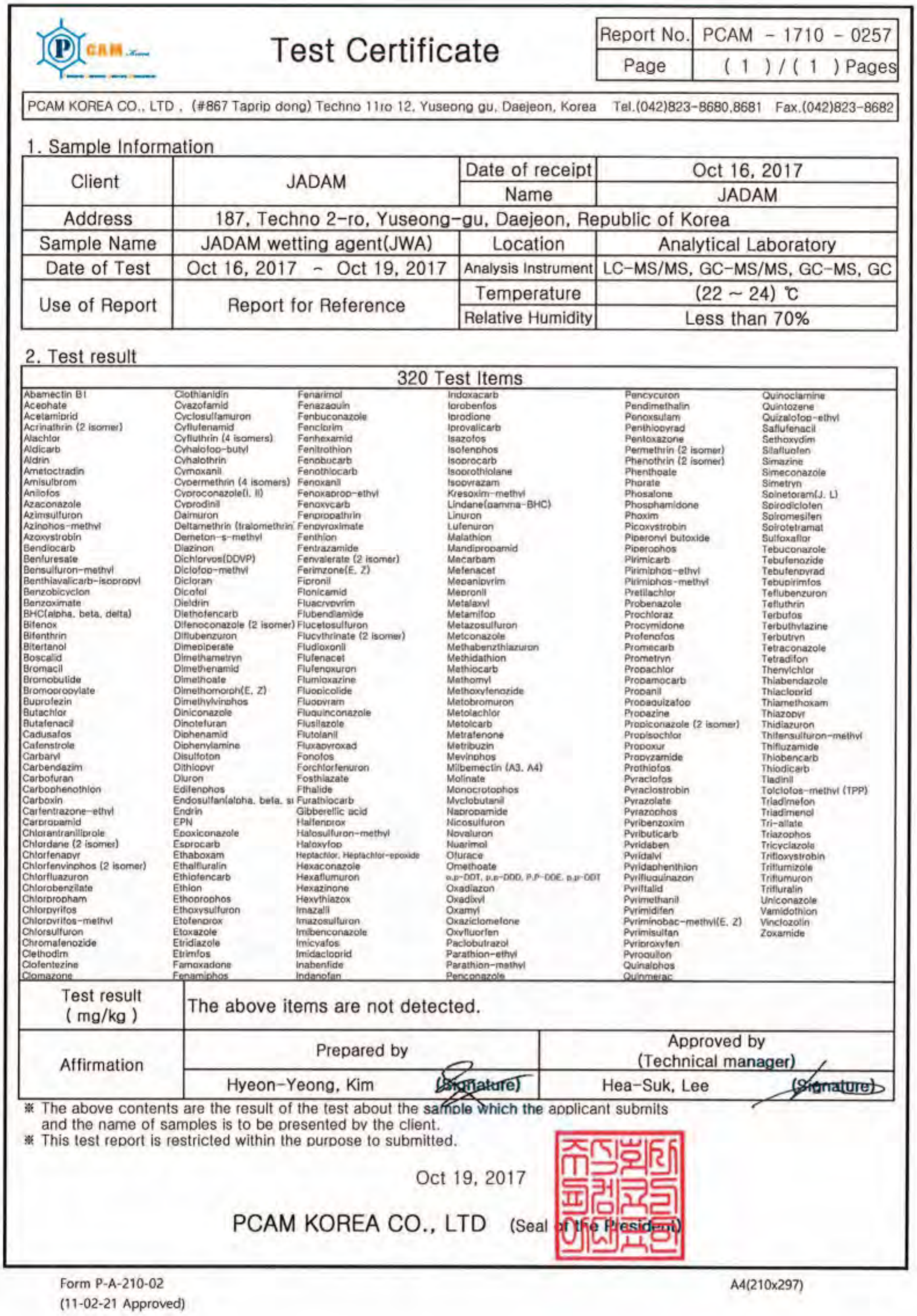
※ The above contents are the result of the test about the sample which the applicant submits and the name of samples is to be presented by the client.
※ This test report is restricted within the purpose to submitted.

Oct 19, 2017

PCAM KOREA CO., LTD (Seal of the President)

Form P-A-210-02
(11-02-21 Approved)

A4(210x297)



PCAM Korea

Test Certificate

Report No.	PCAM - 1710 - 0257
Page	(1) / (1) Pages

PCAM KOREA CO., LTD , (#867 Taprip dong) Techno 11ro 12, Yuseong gu, Daejeon, Korea Tel.(042)823-8680,8681 Fax.(042)823-8682

1. Sample Information

Client	JADAM	Date of receipt	Oct 16, 2017
		Name	JADAM
Address	187, Techno 2-ro, Yuseong-gu, Daejeon, Republic of Korea		
Sample Name	JADAM wetting agent(JWA)	Location	Analytical Laboratory
Date of Test	Oct 16, 2017 ~ Oct 19, 2017	Analysis Instrument	LC-MS/MS, GC-MS/MS, GC-MS, GC
Use of Report	Report for Reference	Temperature	(22 ~ 24) ℃
		Relative Humidity	Less than 70%

2. Test result

320 Test Items

Abamectin B1
Acephate
Acetamiprid
Acrinathrin (2 isomer)
Alachlor
Aldicarb
Aldrin
Ametoctradin
Amisulbrom
Anilofos
Azaconazole
Azimsulfuron
Azinphos-methyl
Azoxystrobin
Bendiocarb
Benfuresate
Bensulfuron-methyl
Benthiavalicarb-isopropyl
Benzobicyclon
Benzoximate
BHC(alpha, beta, delta)
Bifenox
Bifenthrin
Bitertanol
Boscalid
Bromacil
Bromobutide
Bromopropylate
Buprofezin
Butachlor
Butafenacil
Cadusafos
Cafenstrole
Carbaryl
Carbendazim
Carbofuran
Carbophenothion
Carboxin
Carfentrazone-ethyl
Carpropamid
Chlorantraniliprole
Chlordane (2 isomer)
Chlorfenapyr
Chlorfenvinphos (2 isomer)
Chlorfluazuron
Chlorobenzilate
Chlorpropham
Chlorpyrifos
Chlorpyrifos-methyl
Chlorsulfuron
Chromafenozide
Clethodim
Clofentezine
Clomazone
Clothianidin
Cyazofamid
Cyclosulfamuron
Cyflufenamid
Cyfluthrin (4 isomers)
Cyhalofop-butyl
Cyhalothrin
Cymoxanil
Cypermethrin (4 isomers)
Cyproconazole(I, II)
Cyprodinil
Daimuron
Deltamethrin (tralomethrin
Demeton-s-methyl
Diazinon
Dichlorvos(DDVP)
Diclofop-methyl
Dicloran
Dicofol
Dieldrin
Diethofencarb
Difenoconazole (2 isomer)
Diflubenzuron
Dimepiperate
Dimethametryn
Dimethenamid
Dimethoate
Dimethomorph(E, Z)
Dimethylvinphos
Diniconazole
Dinotefuran
Diphenamid
Diphenylamine
Disulfoton
Dithiopyr
Diuron
Edifenphos
Endosulfan(alpha, beta, s
Endrin
EPN
Epoxiconazole
Esprocarb
Ethaboxam
Ethalfluralin
Ethiofencarb
Ethion
Ethoprophos
Ethoxysulfuron
Etofenprox
Etoxazole
Etridiazole
Etrimfos
Famoxadone
Fenamiphos
Fenarimol
Fenazaquin
Fenbuconazole
Fenclorim
Fenhexamid
Fenitrothion
Fenobucarb
Fenothiocarb
Fenoxanil
Fenoxaprop-ethyl
Fenoxycarb
Fenpropathrin
Fenpyroximate
Fenthion
Fentrazamide
Fenvalerate (2 isomer)
Ferimzone(E, Z)
Fipronil
Flonicamid
Fluacrypyrim
Flubendiamide
Flucetosulfuron
Flucythrinate (2 isomer)
Fludioxonil
Flufenacet
Flufenoxuron
Flumioxazine
Fluopicolide
Fluopyram
Fluquinconazole
Flusilazole
Flutolanil
Fluxapyroxad
Fonofos
Forchlorfenuron
Fosthiazate
Fthalide
Furathiocarb
Gibberellic acid
Halfenprox
Halosulfuron-methyl
Haloxyfop
Heptachlor, Heptachlor-epoxide
Hexaconazole
Hexaflumuron
Hexazinone
Hexythiazox
Imazalil
Imazosulfuron
Imibenconazole
Imicyafos
Imidacloprid
Inabenfide
Indanofan
Indoxacarb
Iprobenfos
Iprodione
Iprovalicarb
Isazofos
Isofenphos
Isoprocarb
Isoprothiolane
Isopyrazam
Kresoxim-methyl
Lindane(gamma-BHC)
Linuron
Lufenuron
Malathion
Mandipropamid
Mecarbam
Mefenacet
Mepanipyrim
Mepronil
Metalaxyl
Metamifop
Metazosulfuron
Metconazole
Methabenzthiazuron
Methidathion
Methiocarb
Methomyl
Methoxyfenozide
Metobromuron
Metolachlor
Metolcarb
Metrafenone
Metribuzin
Mevinphos
Milbemectin (A3, A4)
Molinate
Monocrotophos
Myclobutanil
Napropamide
Nicosulfuron
Novaluron
Nuarimol
Ofurace
Omethoate
o,p-DDT, p,p-DDD, P,P-DDE, p,p-DDT
Oxadiazon
Oxadixyl
Oxamyl
Oxaziclomefone
Oxyfluorfen
Paclobutrazol
Parathion-ethyl
Parathion-methyl
Penconazole
Pencycuron
Pendimethalin
Penoxsulam
Penthiopyrad
Pentoxazone
Permethrin (2 isomer)
Phenothrin (2 isomer)
Phenthoate
Phorate
Phosalone
Phosphamidone
Phoxim
Picoxystrobin
Piperonyl butoxide
Piperophos
Pirimicarb
Pirimiphos-ethyl
Pirimiphos-methyl
Pretilachlor
Probenazole
Prochloraz
Procymidone
Profenofos
Promecarb
Prometryn
Propachlor
Propamocarb
Propanil
Propaquizafop
Propazine
Propiconazole (2 isomer)
Propisochlor
Propoxur
Propyzamide
Prothiofos
Pyraclofos
Pyraclostrobin
Pyrazolate
Pyrazophos
Pyribenzoxim
Pyributicarb
Pyridaben
Pyridalyl
Pyridaphenthion
Pyrifluquinazon
Pyriftalid
Pyrimethanil
Pyrimidifen
Pyriminobac-methyl(E, Z)
Pyrimisulfan
Pyriproxyfen
Pyroquilon
Quinalphos
Quinmerac
Quinoclamine
Quintozene
Quizalofop-ethyl
Saflufenacil
Sethoxydim
Silafluofen
Simazine
Simeconazole
Simetryn
Spinetoram(J, L)
Spirodiclofen
Spiromesifen
Spirotetramat
Sulfoxaflor
Tebuconazole
Tebufenozide
Tebufenpyrad
Tebupirimfos
Teflubenzuron
Tefluthrin
Terbufos
Terbuthylazine
Terbutryn
Tetraconazole
Tetradifon
Thenylchlor
Thiabendazole
Thiacloprid
Thiamethoxam
Thiazopyr
Thidiazuron
Thifensulfuron-methyl
Thifluzamide
Thiobencarb
Thiodicarb
Tiadinil
Tolclofos-methyl (TPP)
Triadimefon
Triadimenol
Tri-allate
Triazophos
Tricyclazole
Trifloxystrobin
Triflumizole
Triflumuron
Trifluralin
Uniconazole
Vamidothion
Vinclozolin
Zoxamide

Test result (mg/kg)	The above items are not detected.			
Affirmation	Prepared by		Approved by (Technical manager)	
	Hyeon-Yeong, Kim	(Signature)	Hea-Suk, Lee	(Signature)

※ The above contents are the result of the test about the sample which the applicant submits and the name of samples is to be presented by the client.
※ This test report is restricted within the purpose to submitted.

Oct 19, 2017

PCAM KOREA CO., LTD (Seal of the President)

Form P-A-210-02
(11-02-21 Approved)

A4(210x297)

Effect of Agricultural Organic Materials Using Sulfur(JS) and Oil(JWA)on Insect Control in Pepper and Tomato

Chun Woo Nam1* . Young Sang Cho** . Hee Ja Moon* . Se Woong An*.
Tae Cheol Seo* . Hee Chun*

오일제제, 유황제제를 활용한 고추, 토마토 해충방제 효과

남춘우 · 조영상 · 문희자 · 안세웅 · 서태철 · 전희

This experiment was carried out to determine the optimal concentration of agricultural organic materials using sulfur and oil for the insect pest control in pepper and cherry tomato cultivation. The control value of aphids and Oriental tobacco budworm (OTB) was examined one day after spraying with sulfur preparation (SP) (0.33~0.17%), oil preparations (OP) (2.00~0.33%), SP+OP, OP+ginkgo leaf extracts (GLE), SP+OP+GLE on the "Super Manidaa"pepper. The aphid control in pepper was complete by applications of SP+OP (0.25+1.00%) in the early growth stage and the control value was above 98.1% by the application of OP+GLE (1.00+1.00%), SP+OP+GLE (0.25+1.0+1%), SP+OP+GLE (0.25+1.0+0.5%) in the middle to late growth stage while showing 0% in the control treatment. The OTB was completely controlled by the 3 times application with the high concentration of SP+OP (0.25+1.00%) in pepper cultivation. This result indicates that the oil and the sulfur preparations should be applied at low concentration before insect pests do not appeared, and then sprayed at the high concentration after they appear at pepper plant. The greenhouse whitefly in 'Minichal' tomatoes was completely controlled by three times application of SP (0.25~0.33), OP (1.0~2.00%). and all the treatment of SP+OP. However, continuous control with intervals of 1~3 days was considered favorable in the tomato plant. By the periodical control with agricultural organic materials using sulfur and oil, the greenhouse whitefly, which is a high-temperature insect pest, several moths of OTB did not occur at all. In conclusion, SP+OP (0.17% + 0.33%) treatment was the most economical combination to control the aphid, OTB, and greenhouse whitefly in pepper and tomato cultivation when considering operating cost. In addition, we recommend that SP should not be sprayed on the plant shoots during the day time from July to August because of high temperature.

Key words : agricultural organic materials, insect control, sulfur, pepper, tomato

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**JADAM, 187 Techno 2ro, YuSeong-Gu, DaeJeon 34025, Korea[2]
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E-mail address: cwsky@korea.kr

1. Introduction

Korea has entered the status of free trade agreements with agricultural super-powers and strong competitors in the developing world. Operating costs, safety and quality of the product will play important roles in agricultural industry in the future. In terms of operating costs, it costs 6.5 times higher at pepper production in Korea than in China. The cost is 2 to 6 times higher in most crops. Organic farming is being highlighted as a means to enhance the safety of product. However, most organic-certified pesticides only demonstrate 50 to 70 percent of control value of pests which is lower than chemical pesticides. For spreading of organic farming a more effective organic agricultural materials are needed. Sulfur and sulfur derivatives have been traditionally used to control pests, but they had some serious side-effects including damaging steel pipes and plastic. However, a sulfur solution was invented that need not require heating to make sulfur preparations along with oil preparations (Cho, 2012). Their effectiveness has been tested on vegetables, fruits, and many other crops (Jo, 2012). If specific manual for using sulfur and oil can be produced for different crops, pests, and diseases, that will be a significant step forward in the progress of organic farming. Recently, there was a study proving that 0.05% sulfur solution had 70 to 95 percent disease control effect against powdery mildew in tomatoes (Sim et al., 2014). Hong et al. rs (2014) applied microbial pesticide with organic synthesized fungicide diluted twice which demonstrated an effective rate of 70.3-70.9% which was similar to sole application of fungicide. Spraying organic fungicide and organic farm inputs in turns in seven days for two times can reduce the frequency and volume of chemical pesticide application (Hong et al., 2015). Mixing antagonistic microorganisms with fungicide could increase the effectiveness against pepper phytophthora blight (Kim et al., 1991). It was reported that lime-sulfur mixture was most effective against canker in ginseng; red clay-sulfur mixture (dilution 20 to 400) was also effective in proportion to the concentration (Lim et al., 2015). A study revealed that applying sulfur immediately harvest on onions increased carbohydrate, protein, crude ash, fat, and antioxidants like flavonoids (Jo and Surh. 2016).

Sulfur preparations not only has pesticide effect but also contributes to the nutrient level of the produce, urging some to predict that the 21st century will be the era of sulfur.

One of the main tasks of the pepper industry is to enhance its food safety. Oriental tobacco budworm (OTB) is a notorious pest in peppers. In Suwon, this moth is present from late May to early October. There are three climax periods from early June to early September for each generation. Damage starts from early June, peaks in early September. Infestation levels are significantly different each year (Hwang, 1987; Yang et al,. 2004). OTB drills into the pepper fruit, making it difficult to control with chemical pesticides. Damaged fruits fall immediately and cannot be marketed. This moth wreaks similar havoc on tomatoes. The high-temperature pests such as OTB, greenhouse whitefly, aphids, mites and so on are rampant in rain-shelter cultivation during hot periods. This study aimed to evaluate the effective concentration of organic farm inputs against the high-temperature pests, namely, OTBs and aphids in peppers, and greenhouse whitefly in tomatoes.

2. Materials and methods

<Test 1> Effect of agricultural organic materials using SP and OP on insect control in pepper

Sulfur(JS) preparations is made by putting in sulfur (99.9%) 25 kg, NaOH (98%) 20 kg, sea salt 1.5 kg, red clay powder 500g, phyllite powder 500 g in order, adding water 50 L, and stirring with wooden stick in a 100 L heat-resistant plastic (Poly ethylene) container. Ingredients dissolve after about 20 minutes. More water (32 L) is added, stirred, and it is completed. The solution is allowed to sit for 1-3 days to sink the debris. Clear liquid is then transferred to thick-walled plastic containers, sealed, and stored (Jo. 2012).

Oil(JWA) preparations (Jadam wetting agent) is made by putting in KOH (90%) 3.2 kg, then first water of 2.5 L in a 100 L heat-resistant container, rolling the container to dissolve it. Water has to be soft water. Pour in 18 L of canola oil, use electric drill to mix until it becomes like thin mayonnaise. Shut the lid, let sit for three days, and the substance hardens like butter. Add 20 L of water, use drill to separate all the solids from the wall of the container, and dissolve them. Add 60 L of water, stir with a clean wooden stick occasionally, and dissolving will be complete in 24 hours, producing a transparent liquid (Jo. 2012).

The test was done on pepper variety of “Super Manidda.” Seeds were sown on Mar 25 in Wanju county, transplanted on May 29. We tried to find effective recipe against OTBs and aphids by trying: SP (0.33, 0.25, 0.20, 0.17%), OP (2.00, 1.00, 0.50, 0.33%), SP+OPl (0.33+2.00, 0.25+1.00, 0.20+0.50, 0.17+0.33%), OP+GLE (1+1%), SP+OP+GLE (0.25+1+1%), SP+OP+GLE (0.25+1+0.50%). They were repeatedly sprayed and the kill-rate for aphids and OTBs was investigated after a day. Triple repetition of randomized block design was used for allocation of test plots.

<Test 2> Effect of agricultural organic materials using SP and OP on insect control in tomato

This test was carried out on the tomato variety "Minichal". Tomato seeds were sown in Wanju district on March 25 and transplanted on May 27. We searched for an effective control method for greenhouse whiteflies that occurred naturally in the test plot. We tested with SP (0.33, 0.25, 0.20, 0.17%), OP (2.00, 1.00, 0.50, 0.33%), SP+OP (0.33+2.00, 0.25+1.00, 0.20+0.50, 0.17+0.33%), and investigated its kill-rate after one day. Triple repetition of randomized block design was used for allocation of test plots.

- Concentration damage rate (%) = Number of damaged leaves / total leaves × 100
- Disease rate (%) = Diseased leaves / total leaves × 100
- Kill rate (%) = ((Non-sprayed area pest rate – sprayed area pest rate) / Non-sprayed area pest rate) × 100

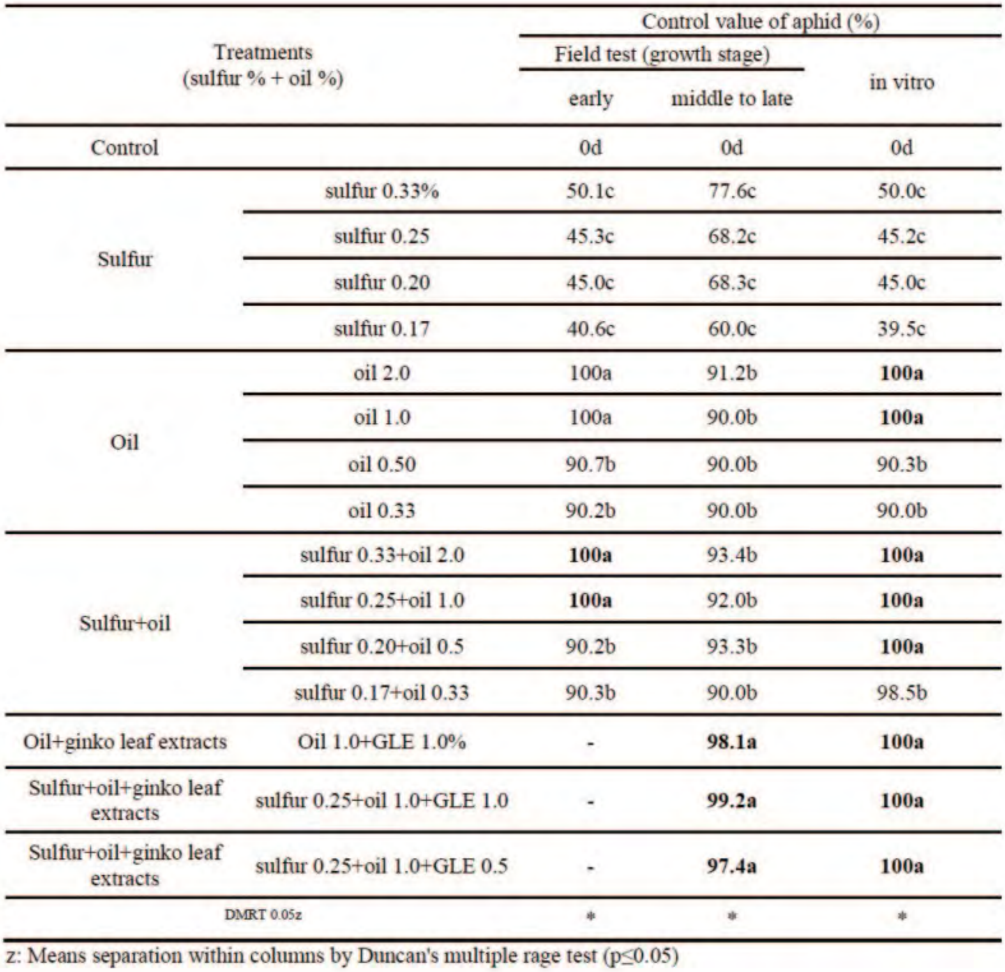
Statistical analysis was conducted using SAS software (Ver 9.2, Cary, NC, USA). The results of each parameter in all three applications were subjected to analysis of variance, and treatment means were compared by Duncan's multiple range test (DMRT) at the 5% probability level.

3. Results and discussion

<Test 1> Effect of organic agricultural materials using SP and OP on insect control in pepper

We applied organic pesticide after aphids appeared. In the early stage, the kill-rate was 100% just with 1% of SP (Table 1). The kill-rate was above 90 percent for 0.5 to 0.33% of OP. SP+OP treatment also showed similar kill-rate to OP, meaning that stronger solution achieved higher kill-rate. In mid-growth stage, kill-rate was 90 percent in strong concentration of higher than 1%. SP+OP also showed similar results. However, OP+GLE showed over 97% kill-rate. Kill-rate was 100% at stronger solution than 1% OP. SP+OP mixture had slightly higher kill-rate. Adding ginkgo extracts also increased the kill-rate slightly. There were previous researches dealing with pesticide soap + 25% palm fatty acid (organic input). This material had over 92% kill-rate for pepper aphids in 50 dilution with two times applications in five days interval. In 100 dilution, with three times applications in five days interval, it had 94% kill-rate (Lee et al., 2002). Egg yolk oil produced 53.2% kill-rate for aphids, however, when used as Neem oil + egg yolk oil (20ppm), it had 96.3% kill-rate (Jee et al., 2010). Previous studies mostly demonstrated that kill-rate increased when sprayed more than twice. This research suggests that an effective control of aphids was possible by applying it once in every growth stages of the pepper. Application of SP alone demonstrated 40~77% kill-rate according to its concentration. Although it is lower kill-rate than using oil alone, it still had some effect. The mixing seems to create a synergistic effect (Table 1). Although not shown on the table, the pepper did not reveal any difference in growth according to different sprays, implying that sulfur and oil do not affect the pepper plant growth.

Table 1. The control effect of aphid as affected by organic agricultural materials using sulfur and oil preparation in organic pepper farming

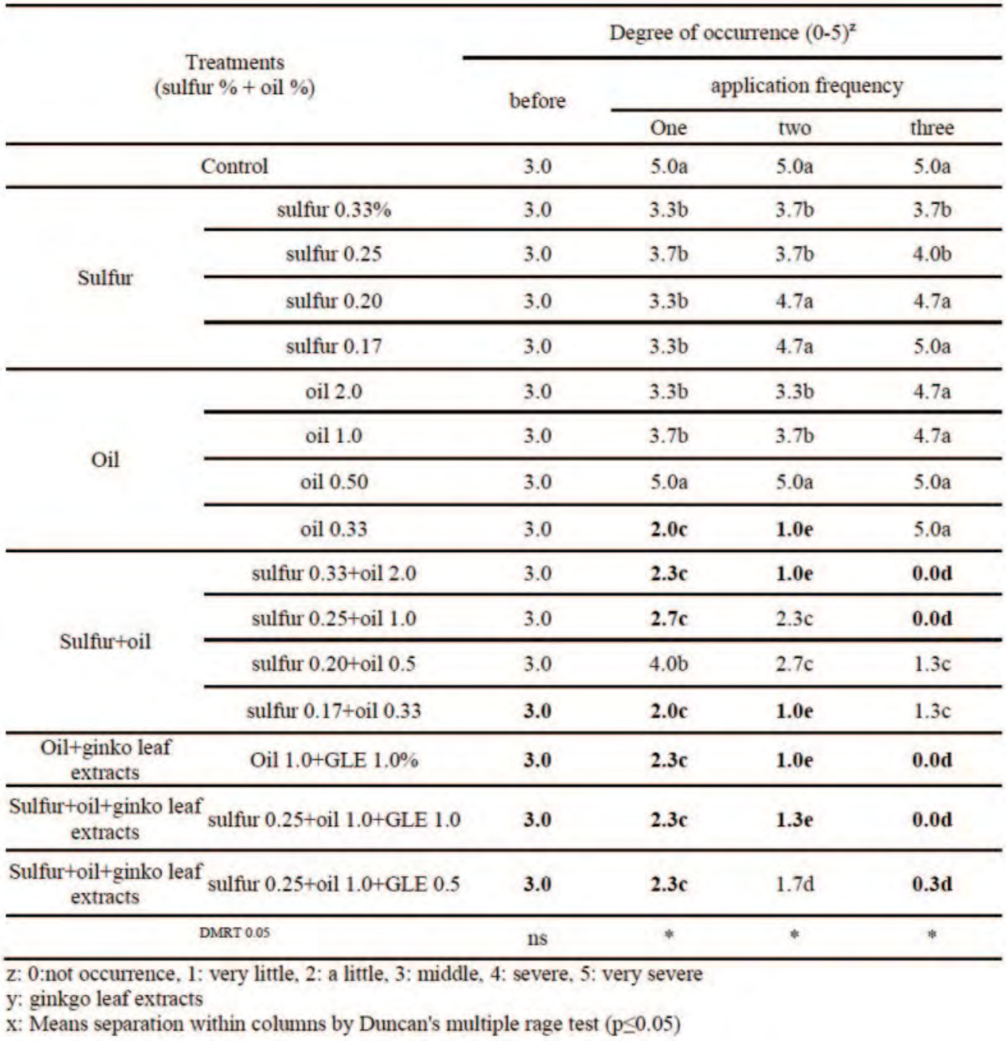


Treatments (sulfur % + oil %)		Control value of aphid (%)		
		Field test (growth stage)		in vitro
		early	middle to late	
Control		0d	0d	0d
Sulfur	sulfur 0.33%	50.1c	77.6c	50.0c
	sulfur 0.25	45.3c	68.2c	45.2c
	sulfur 0.20	45.0c	68.3c	45.0c
	sulfur 0.17	40.6c	60.0c	39.5c
Oil	oil 2.0	100a	91.2b	**100a**
	oil 1.0	100a	90.0b	**100a**
	oil 0.50	90.7b	90.0b	90.3b
	oil 0.33	90.2b	90.0b	90.0b
Sulfur+oil	sulfur 0.33+oil 2.0	**100a**	93.4b	**100a**
	sulfur 0.25+oil 1.0	**100a**	92.0b	**100a**
	sulfur 0.20+oil 0.5	90.2b	93.3b	**100a**
	sulfur 0.17+oil 0.33	90.3b	90.0b	98.5b
Oil+ginko leaf extracts	Oil 1.0+GLE 1.0%	-	**98.1a**	**100a**
Sulfur+oil+ginko leaf extracts	sulfur 0.25+oil 1.0+GLE 1.0	-	**99.2a**	**100a**
Sulfur+oil+ginko leaf extracts	sulfur 0.25+oil 1.0+GLE 0.5	-	**97.4a**	**100a**
DMRT 0.05z		*	*	*

z: Means separation within columns by Duncan's multiple rage test ($p \leq 0.05$)

In case of OTB, the pest control was complete with three times applications of SP+OP (0.25+1.00%). SP+OP (0.25+1.00%)+GLE also had high kill-rate. However, the precise effect of ginkgo leaves was still unknown. Regular spraying at low concentration of agricultural organic materials is desirable when there were no pest outbreak. Increase of application concentration is more effective and economical (Table 2).

Table 2. The degree of occurrence oriental tobacco budworm (OTB) and control value as affected by organic agricultural materials using sulfur and oil preparation in organic pepper farming Treatments



Treatments (sulfur % + oil %)		Degree of occurrence (0-5)^z			
		before	application frequency		
			One	two	three
Control		3.0	5.0a	5.0a	5.0a
Sulfur	sulfur 0.33%	3.0	3.3b	3.7b	3.7b
	sulfur 0.25	3.0	3.7b	3.7b	4.0b
	sulfur 0.20	3.0	3.3b	4.7a	4.7a
	sulfur 0.17	3.0	3.3b	4.7a	5.0a
Oil	oil 2.0	3.0	3.3b	3.3b	4.7a
	oil 1.0	3.0	3.7b	3.7b	4.7a
	oil 0.50	3.0	5.0a	5.0a	5.0a
	oil 0.33	3.0	**2.0c**	**1.0e**	5.0a
Sulfur+oil	sulfur 0.33+oil 2.0	3.0	**2.3c**	**1.0e**	**0.0d**
	sulfur 0.25+oil 1.0	3.0	**2.7c**	2.3c	**0.0d**
	sulfur 0.20+oil 0.5	3.0	4.0b	2.7c	1.3c
	sulfur 0.17+oil 0.33	**3.0**	**2.0c**	**1.0e**	1.3c
Oil+ginko leaf extracts	Oil 1.0+GLE 1.0%	**3.0**	**2.3c**	**1.0e**	**0.0d**
Sulfur+oil+ginko leaf extracts	sulfur 0.25+oil 1.0+GLE 1.0	**3.0**	**2.3c**	**1.3e**	**0.0d**
Sulfur+oil+ginko leaf extracts	sulfur 0.25+oil 1.0+GLE 0.5	**3.0**	**2.3c**	1.7d	**0.3d**
DMRT 0.05		ns	*	*	*

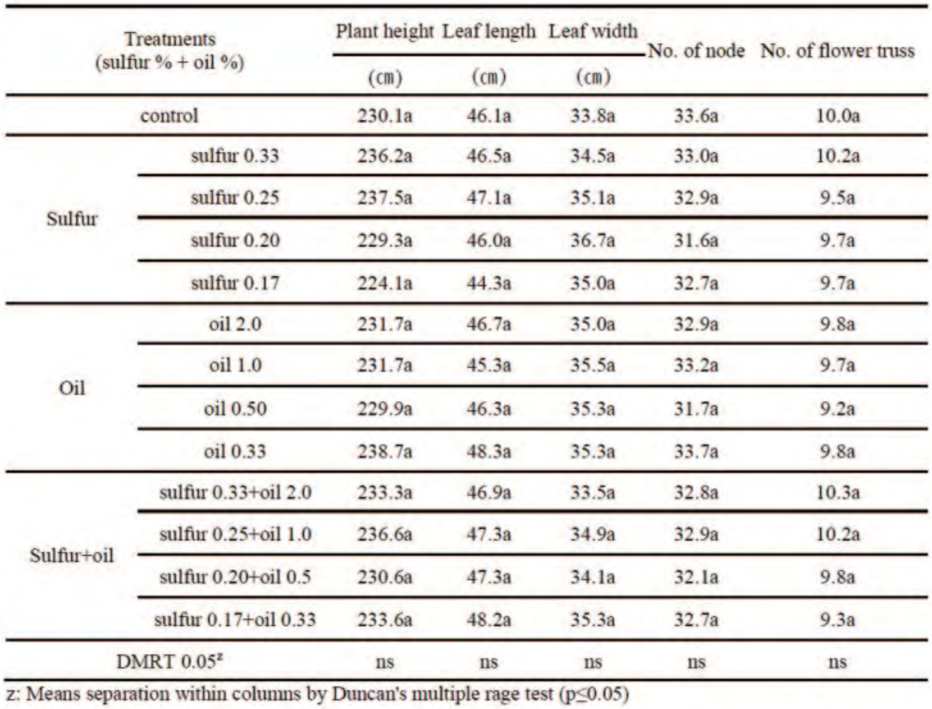
z: 0:not occurrence, 1: very little, 2: a little, 3: middle, 4: severe, 5: very severe
y: ginkgo leaf extracts
x: Means separation within columns by Duncan's multiple rage test ($p \leq 0.05$)

Organic pesticides are usually sprayed in the evening or in a cloudy day to increase its potency. It is thought that spraying after sunset will allow the pesticide to remain on the pest for over 4 hours with the delivery improvement. It is suggested that spraying against OTB is effective in the evening by excluding direct sunlight or cloudy day, particularly in 1 or 2 days interval because OTB seems to move between the pepper fruits in one or two days. It is difficult to spray the agricultural organic materials when OTB is inside the fruit. However, the killing effect of spraying the materials is getting higher during OTB moving time. Pepper did not show any signs of stress by the spraying the high-concentration of SP (0.33%). However, the application of strong concentration of SP in direct sunlight condition caused partial leaf burning. It is important to use sulfur in the evening out of direct sunlight or cloudy days (Table 1, 2).

<Test 2> Effect of organic agricultural materials using SP and OP on insect control in tomato

The application organic agricultural materials made of oil, sulfur, ginkgo leaf extract does not affect the growth of the cherry tomato plant. There was no statistical significance in the leaf length, leaf width, number of nodes, flowers, etc. (Table 3).

Table 3. The growth characteristic as affected by organic agricultural materials using sulfur and oil preparation in organic tomato farming.



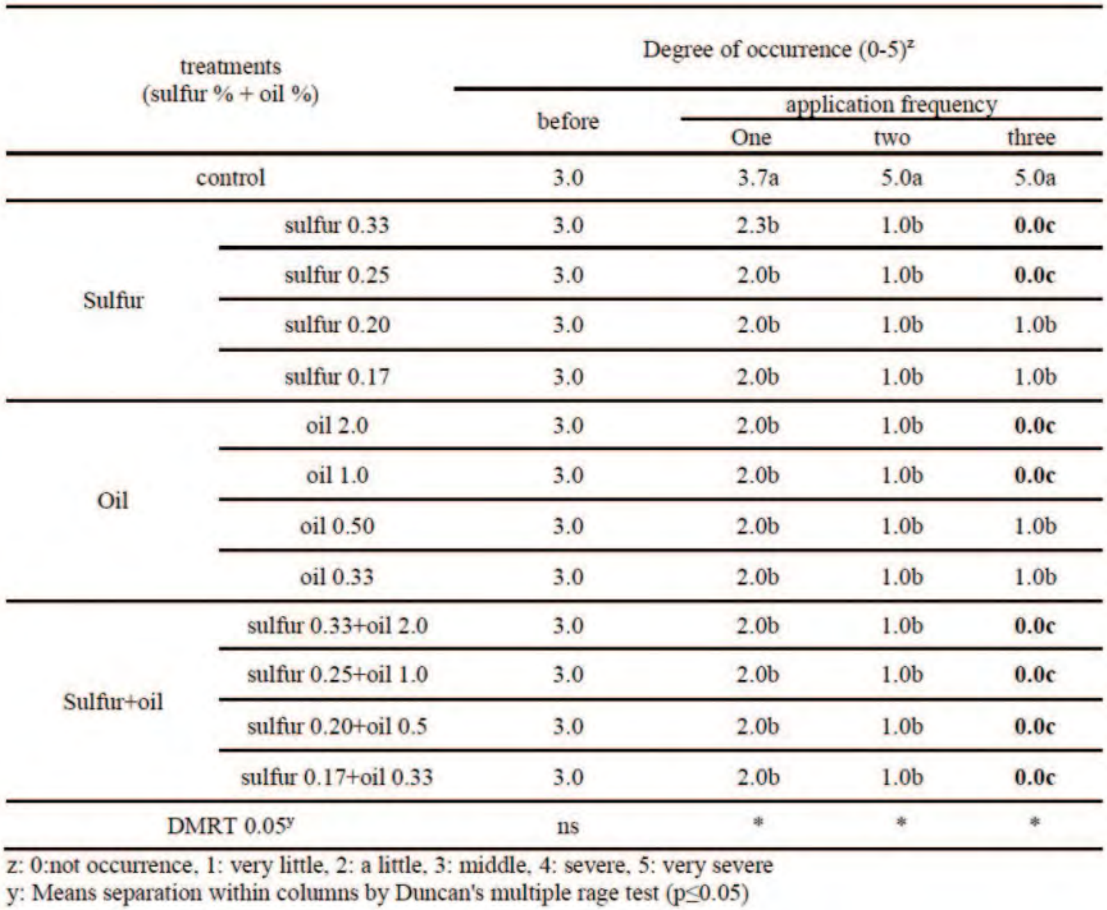
Treatments (sulfur % + oil %)		Plant height (cm)	Leaf length (cm)	Leaf width (cm)	No. of node	No. of flower truss
control		230.1a	46.1a	33.8a	33.6a	10.0a
Sulfur	sulfur 0.33	236.2a	46.5a	34.5a	33.0a	10.2a
	sulfur 0.25	237.5a	47.1a	35.1a	32.9a	9.5a
	sulfur 0.20	229.3a	46.0a	36.7a	31.6a	9.7a
	sulfur 0.17	224.1a	44.3a	35.0a	32.7a	9.7a
Oil	oil 2.0	231.7a	46.7a	35.0a	32.9a	9.8a
	oil 1.0	231.7a	45.3a	35.5a	33.2a	9.7a
	oil 0.50	229.9a	46.3a	35.3a	31.7a	9.2a
	oil 0.33	238.7a	48.3a	35.3a	33.7a	9.8a
Sulfur+oil	sulfur 0.33+oil 2.0	233.3a	46.9a	33.5a	32.8a	10.3a
	sulfur 0.25+oil 1.0	236.6a	47.3a	34.9a	32.9a	10.2a
	sulfur 0.20+oil 0.5	230.6a	47.3a	34.1a	32.1a	9.8a
	sulfur 0.17+oil 0.33	233.6a	48.2a	35.3a	32.7a	9.3a
DMRT 0.05^z		ns	ns	ns	ns	ns

z: Means separation within columns by Duncan's multiple rage test ($p \leq 0.05$)

Greenhouse whiteflies on cherry tomatoes was killed by 100% with three times application of SP (0.17%) + OP (0.33%). When used respectively, sulfur killed them in 400 dilution (SP 0.25%) and oil in 100 dilution (OP 1.0%). Previous researches on microbial solution and egg yolk oil showed that microbial input's kill-rate was 49.0~55.9% for grey fungus and 39.2~58.2% for leaf fungus. Egg yolk oil mixture featured a 97.6% for tomato powdery mildew (Hong et al., 2012). Against tomato powdery mildew, P. polymyxa CW pathogen culture has been applied at different dilutions of 106, 107, 108 cfu/ml. Non-treated field showed that the diseased area percentage of 56.3% whereas treated field had much less disease occurrence of 0.03, 19.5, 45.7% (Kim et al., 2013). For tomato grey fungus, EXTN-1 and Bacillus subtilis strain B17 had been applied during transplant through drip irrigation, twice in two weeks on the soil, and four times on the leaves from early flowering. This showed the highest disease-control rate of 57.0% and 55.1% (Kim et al., 2012). Although many reports earlier mentioned, there are not any researches on prevention of insect pest problem in tomatoes such as greenhouse whiteflies. Our results showing high kill-rate of this pest demonstrate that this natural pesticide utilizing sulfur and oil has high potential and needs further research.

The number of greenhouse whiteflies decreased with all treatments. It is thought that three times of continued application with one or two days interval is a way to increase the potency (Table 4). In our experiment, tomatoes did not show any concentration damage in strong solution of OP (0.33%). Damage was observed with complete spray of SP+OP (0.33+1.0%) and SP+OP (0.25+0.5%). However, there were no damages when sprayed beneath the flower buds. Concentration damage from SP usually appears in July to August in the hot season. Therefor this research suggests that the spray of these materials should not be used for flower buds on new shoots (Nam et al., 2015) and sulfur should be used on evening with no existence of direct sunlight or cloudy days. Concentration damage issue of sulfur needs further study; it was reported that continued use of sulfur could cause damage on grapes, persimmons, and walnuts if it is too strong (Cho. 2012). Meanwhile, sulfur has been used as a raw material for lime sulfur mixture, but it has been limited to use because it is weak. However, the sulfur preparations used in this study were produced through chemical reaction without any heat, and showed almost no side effect. Although not shown in the data, as a result of analysis of As, Cd, Hg and Pb, 0.33% of sulfur and 0.33~2.0% of oil were not detected for the harmful effects of sulfur and oil preparation.

Table 4. The degree of occurrence of greenhouse whitefly and control result as affected by agricultural materials of organic farming in tomato.



treatments (sulfur % + oil %)		Degree of occurrence (0-5)[z]			
		before	application frequency		
			One	two	three
control		3.0	3.7a	5.0a	5.0a
Sulfur	sulfur 0.33	3.0	2.3b	1.0b	**0.0c**
	sulfur 0.25	3.0	2.0b	1.0b	**0.0c**
	sulfur 0.20	3.0	2.0b	1.0b	1.0b
	sulfur 0.17	3.0	2.0b	1.0b	1.0b
Oil	oil 2.0	3.0	2.0b	1.0b	**0.0c**
	oil 1.0	3.0	2.0b	1.0b	**0.0c**
	oil 0.50	3.0	2.0b	1.0b	1.0b
	oil 0.33	3.0	2.0b	1.0b	1.0b
Sulfur+oil	sulfur 0.33+oil 2.0	3.0	2.0b	1.0b	**0.0c**
	sulfur 0.25+oil 1.0	3.0	2.0b	1.0b	**0.0c**
	sulfur 0.20+oil 0.5	3.0	2.0b	1.0b	**0.0c**
	sulfur 0.17+oil 0.33	3.0	2.0b	1.0b	**0.0c**
DMRT 0.05[y]		ns	*	*	*

z: 0:not occurrence, 1: very little, 2: a little, 3: middle, 4: severe, 5: very severe

y: Means separation within columns by Duncan's multiple rage test ($p \leq 0.05$)

Hearafter the studies on the effect of SP+OP application on another pests and diseases such as greenhouse greenlies, mites, canker and fungus rampant in nearby pepper fields will be necessary because there are free of them in the test field during the experiment.

4. Conclusions

This study was carried out to determine the optimal concentration of agricultural organic materials using sulfur and oil for the insect pest control in pepper and tomato cultivation. The aphid control in pepper was complete by applications of SP+OP (0.25+1.0%) in the early growth stage and the control value was above 98.1% by the application of OP+GLE (1.0+1.0%), SP+OP+GLE (0.25+1.0+1.0%), SP+OP+GLE (0.25+1.0+0.5%) in the middle to late growth stage while showing 0% in the control treatment. The OTB were completely controlled by the 3 times application with the high concentration of SP+OP (0.25+1.0%) in pepper cultivation. The greenhouse whitefly in 'Minichal' tomatoes was completely controlled by three times application of SP (0.25~0.33), OP (1.0~2.0%). and all the treatment of SP+OP. As the results, SP+OP (0.17+0.33%) treatment was the most economical combination when considering operating cost.

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Effect of JADAM Natural Pesticide solution on Coffee Berry Borer(CBB)

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Chunwoo Nam****

Abstract

The JADAM team conducted a CBB study in January 2016,[1]and based on these results, conducted studies to determine the optimal concentration of JADAM natural pesticide materials. Three types of mixed pesticides A, B and C were prepared by gradually reducing the concentration of each substance and applied to areas A, B and C, respectively. Control area D was defined as adjacent to area A, and OK Farm was controlled by Botanicgard and Admiral pro.

JADAM natural pesticides were sprayed 14 times at intervals of about 2 weeks from February 18. The CBB infestation survey was conducted 12 times at intervals of about 2 weeks from March 29. The average CBB infestation for each area was 0.44% for area A, 0.26% for area B, 0.24% for area C, and 0.93% for control D area. The CBB infestation in the areas B and C decreased to around 0.1% from July to August. (Table 1). The CBB infestation in A, B, C, and D areas showed similar overall trends. During the entire study period, CBB infestation were less in control areas A, B, and C than in control D. (Figure 1), (Figure 2). Based on the CBB survey, we concluded that CBB can be controlled in a flexible manner, usually by spraying C type pesticides and changing them to B type pesticides if necessary. The mixing ratio of C type natural pesticides is based on 379 L (100 gal), JADAM Wetting Agent (JWA) 6.0 L, JADAM Sulfur (JS) 0.6 L, sodium hydroxide 0.5 kg, and Azomite 0.4 kg. 379 L (100 gal) of natural pesticide is sprayed once, and the cost of pesticide raw material is about $ 11.1 [2].

Keywords: coffee berry borer, CBB, Hypothenemus hampei, JADAM Organic Farming, JADAM Sulfur (JS), JADAM Wetting Agent (JWA), JADAM Natural Pesticide.

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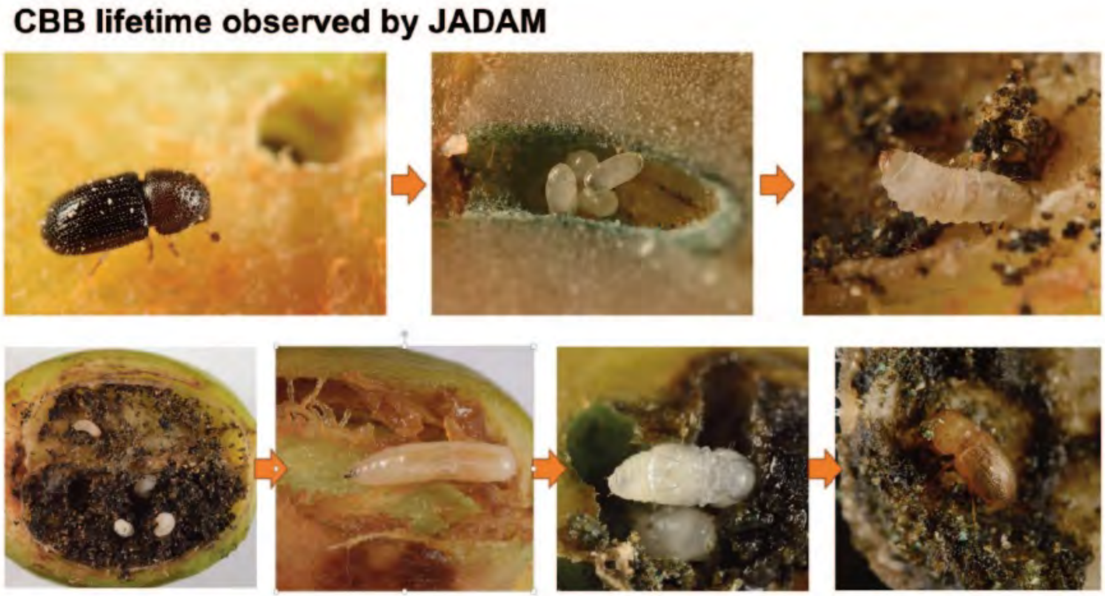
Introduction


CBB lifetime observed by JADAM

The maturation of the insect (from egg to adult) is around 24 to 45 days. Two days after the insect digs into a coffee bean, it spawns 35–50 eggs inside the bean. It reproduces three to five generations of CBB on a coffee tree. Therefore, if controlling CBB fails, it will increase exponentially and threaten farmers.

Coffee is the most widely traded agricultural product in about 80 tropical countries. The biggest factor of limiting stable coffee production is that the CBB pest causes more than $ 500 million losses in annual[3]. CBB was the first detected in the Kona District of Hawaii Island in 2010, and since that it had appeared to around 800 coffee farms on the island. Moreover, CBB was found on the neighboring Hawaiian Islands of Oahu (2014) and Maui (2016)[4] . The coffee production has been a profitable agriculture historically, but it has changed after CBB appeared and damaged the coffee. CBB started to degrade coffee quality and increased the production costs by 10-15%.[5]

The maturation of the insect (from egg to adult) is around 24 to 45 days. Two days after CBB enters a coffee bean, it spawns 35 to 50 eggs. It reproduce three to five generations on one tree[6] .Therefore, if controlling CBB fails, the population of it will increase dramatically. With increasing density of CBB all over Hawaii, coffee growers face considerable difficulties due to increased costs, lower quality of beans, and increased the cost of pest management. However, there are few clear methods to control the CBB globally. Under these circumstances, the JADAM team with the support of the Hawaii government, conducted a study to control the CBB with environmentally friendly pesticides made by permitted materials from the USDA Organic Regulations[7] to address the problems faced by Hawaiian coffee farmers.

The study was conducted at OK Farm (1570 Maikalani St, Hilo, HI 96720). The variety of coffee is 'Catura' and it is 10 years old. Nearly all coffee beans contained CBB when JADAM team visited the farm on November 12, 2017. We divided the farm into three areas A, B, and C. The total number of coffee tree is around 750 in the three areas and each area is around 0.3 ac with 250 coffee trees. The control D is located about 5 m away from the area A. Before, we start the research, we removed the last year fruits on the coffee tree in the whole areas. Three types of mixed pesticides with different concentration rate for the areas A, B and C were prepared and applied to areas A, B and C, respectively. From February 18 to September 18, the pesticide was sprayed for 14 times at intervals of about 2 weeks.

The CBB damage rate survey was conducted 12 times at intervals of about 2 weeks from March 29 to August 27. 30 trees were randomly selected for each area and collected damaged fruits by CBB from those selected trees. After collecting the beans, the coffee beans were cut with a knife, and then the location, and existence of CBB were verified and recorded. The survey was conducted according to the CTAHR (College of Tropical Agriculture and Human Resources) provided forms and instructions. The control D area was confirmed that it has been controlled by Botanicgard and Admiral pro at 2 to 4 weeks intervals at OK farm side. From late July, coffee harvest began at OK farm.

Ingredients and method

The JADAM team had achieved successful results of controlling CBB with JADAM natural pesticides on January 25, 2016 in Kona, Hawaii.[1] Based on these results, we have made three types of mixing ratio of natural pesticide raw materials. Three types of JADAM natural pesticides were made only by permitted materials from the USDA Organic Regulations.[7]

<Function and manufacturing method of JADAM Wetting Agent (JWA)>[8]

JWA was developed by Youngsang Cho in a way to reduce manufacturing time to 10 to 1 without heating. It is also very good as a natural detergent. JWA is a substance that helps to spread pesticides on trees, fruits and pests. We use 5 ~ 15L of JWA with water to make 500L. The greater the amount of JWA, the higher, the insecticidal and disinfecting effect.
- Manufacturing method: Dissolve 3.2 kg of potassium hydroxide in 2.5 L of water, add 18 L of canola oil, and turn with electric drill for 10 minutes. Close lid and keep it for 3 days. After 3 days, add 82.5 L of water to dissolve and the JWA of 100 L is completed. You must use soft water to make JWA. There is no expiration date on JWA, and the production cost of 1 L is about $ 1.

<Function and manufacturing method of JADAM sulfur (JS)>[9]

JS is manufactured in a revolutionary way to dissolve sulfur without heating. It was invented by Youngsang Cho. JS has strong sterilization effect and does not damage plastic and iron pipe. You can use 0.5 ~ 1.5L of JS with water to make 500L. 0.5L of JS is used at the beginning of crop growth to increase the usage. Mixing with JWA is effective for the most difficult anthracnose control. Greenhouse crops, grapes, pumpkins, and persimmon are sensitive to JS. Therefore, it should be used little amount, 0.5 L of JS for those crops. JS has been added to pesticides to control CBB because CBB's digestion function becomes weak and its activity may slowed down.
- Manufacturing method: Add 25 kg of Sulfur Powder [99.9%] to a heat-resistant container and add 1.5 kg of salt and 1 kg of fine soil. Next, add 20 kg of sodium hydroxide (NaOH, 99%), add 50 L of water (54 L for the tropics) and stir thoroughly with a wooden bar. As it mixes with water, its own heat rises to over 100 degrees Celsius and the sulfur dissolves in the water. It takes about 10 minutes to completely dissolve sulfur. Then add 32 L of water. After you added more water, stir well for the last time. Close lid and let sit for 24 hours. After 24 hours, you will get the completed 100 L of JS. JS has no expiration date and the production cost of 1L is about $ 2.

<Function of Sodium Hydroxide and solution manufacturing method>

Sodium hydroxide solution adsorbs on CBB. It will give heat and pain to the skin of CBB. Moreover, it can cause strong friction heat and pain between wing and body during flight. So a mixture of sodium hydroxide solution and JWA becomes a powerful slug / snail pesticide. This pesticide causes severe fever and pain to the snail to die[10]. Sodium hydroxide is an important factor in enhancing the efficacy of CBB pesticides.

- Manufacturing method: Sodium Hydroxide [NaOH, 99%] is added in the same amount of water. It melts instantly and it generate heat.

<Function of Azomite and solution manufacturing method>

Instead of Azomite, you can use fine soil. If you mix fine soil with pesticides, the pesticide penetrates into fine places and has the effect of delaying evaporation of pesticides. Mixing sodium hydroxide solution with JWA and fine soil maximizes insecticidal effect.

- Manufacturing method: Mix Azomite with 20 times more water, and stir by hand to mix well. After sitting for 1 minute, take Azomite water from the upper portion and mix it with pesticide.

The following are the mixed ratios of natural pesticides applied in areas A, B and C, respectively. Before putting it to practice, we tested each pesticides. We sprayed directly to CBB and It died in about 15 seconds.

- Area A 379L(100gal): JADAM Wetting Agent 9.0 L, JADAM Sulfur 1.1 L, Sodium Hydroxide 1.1 kg, and Azomite 0.8 kg
- Area B 379L(100gal): JADAM Wetting Agent 7.6 L, JADAM Sulfur 0.75 L, Sodium Hydroxide 0.8 kg, and Azomite 0.6 kg
- Area C 379L(100gal): JADAM Wetting Agent 6.0 L, JADAM Sulfur 0.6 L, Sodium Hydroxide 0.5 kg, and Azomite 0.4 kg. We used soft water (rain water) for the pesticides.

Results and Discussion

The CBB infestation in area A was 1.96% in the beginning, 0.12% at the end and 0.44% on the average. The CBB infestation in area B was 0.65% at first, 0.04% at the end and 0.26% on the average. The CBB infestation in area C was 1.08% at the start, 0.05% at the end and 0.24% on the average. The CBB infestation in area D was 3.29% at the beginning, 0.17% at the end and 0.93% on the average. The CBB infestation in the areas B and C decreased to around 0.1% from July to August (Table1) (Figure 2).

The first CBB infestations of A, B, and C were lower than Area D. For the reason, It is estimated that applying JADAM natural pesticide for 4 times before March 29 was effective. It was difficult to carry out the CBB infestation survey before March 29 because coffee beans were small and flowers were in bloom.

During the survey period, the CBB infestation showed a similar trend overall without any significant change. In the areas A, B, and C where the JADAM natural pesticide was sprayed, the CBB infestation was less than area D. Area A, where the concentration of the natural pesticide material was highest, caused the edge of the coffee leaf to turn red. However, in the areas B and C, damage such as concentration damage, fallen blossoms or fallen fruit did not occur. Based on this observation, we confirmed that CBB can be controlled with natural pesticide substances with the lowest concentration of C type natural pesticides. Based on the CBB research, we concluded that CBB can be controlled in a flexible approach, by spraying C type pesticides on regular base and changing it to B type pesticides if it is necessary.

The mixing ratio of C type natural pesticides applied in Area C is 6.0 L of JADAM Wetting Agent (JWA), 0.6 L of JADAM sulfur (JS), 0.5 kg of sodium hydroxide and 0.4kg of Azomite. Mix those ingredients with water to make 379 L (100gal). Approximately, 379 L (100gal) of pesticide was sprayed on 1 ac at a time and the cost of the pesticide material is about $ 11.1. [2].

In the areas A, B and C, various pests appeared, but they were completely controlled during the course of spraying the natural pesticides. JADAM pesticides controlled not only CBB but also various pests that damage coffee trees. Although the pesticides were sprayed 14 times at intervals of about 2 weeks, it is possible that the pesticide spraying period could be adjusted every 2 to 4 weeks based on the results of the CBB infestation survey.

The results of JADAM's research shows that CBB, the biggest difficulty in Hawaiian coffee agriculture, can be almost completely resolved. This means that coffee organic cultivation can be done at ultra low-cost. JADAM Natural pesticides have no chemical pesticide residues at all. So you can immediately pass the pesticide detection test, which is a problem when exporting Hawaiian coffee overseas. The JADAM natural pesticide solution will greatly contribute to the prosperity of Hawaii coffee agriculture. This research was supported by the State of Hawaii.

Reference

[1] https://youtu.be/mgW6IwopGio
[2] The total amount of $ 11.1 is [JWS $ 6] +, [JS $ 1.2] + [Azomite $ 1] + [NaOH $ 2.9]
[3] J. Agric. Food Chem., 2018, 66 (21), pp 5275–5280
[4]. Burbano E., Wright M., Bright D.E., Vega F.E. New record for the coffee berry borer, Hypoth-

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[5] 10. Leung P.S., Kawabata A.M., Nakamoto S.T. Estimated Economy-Wide Impact of CBB for the Crop Years 2011/12 and 2012/13. University of Hawaii; Manoa, HI, USA: 2016. Report of Hawaii Congressional Delegation.

[6] Bustillo et al. 1998, Damon 2002, Jaramillo et al. 2006, Barrera 2008, Vega 2008, Vega et al. 2009

[7] https://www.ams.usda.gov/rules-regulations/organic

[8] Youngsang Cho. 2012. JADAM Organic farming. p. 258-267.

[9] Youngsang Cho. 2012. JADAM Organic farming. p. 268-281.

[10] Youngsang Cho. 2012. JADAM Organic farming. p. 319.

Note: Prices of raw materials required for JADAM natural pesticide manufacturing (Amazon.com)

- Canila oil 18L : $72
- Potassium Hydroxide [KOH, 90%]3.2kg : $ 32
- Sodium Hydroxide [NaOH, 99%] 20kg : $117
- Sulfur Powder [99.9%] 25kg : $80
- Azomite Micronized Bag, 20kg : $46

Table1. Percent Infestation by CBB, Total & Average

Spray Date	A area	B area	C area	D area
29.Mar	1.96	0.65	1.08	3.29
12.Apr	0.3	0.65	0.15	0.99
27.Apr	0.7	0.59	0.16	1.73
9.May	0.38	0.27	0.14	1.3
21.May	0.4	0.1	0.12	0.78
4.Jun	0.3	0.19	0.31	0.39
17.Jun	0.42	0.38	0.25	0.52
2.Jul	0.31	0.12	0.23	0.73
16.Jul	0.2	0.1	0.18	0.5
30.Jul	0.07	0.1	0.06	0.2
13.Aug	0.17	0.03	0.16	0.58
27.Aug	0.12	0.04	0.05	0.17
Total	5.33	3.22	2.89	11.18
Average	0.44	0.26	0.24	0.93

Figure 1. Percent Infestation by CBB

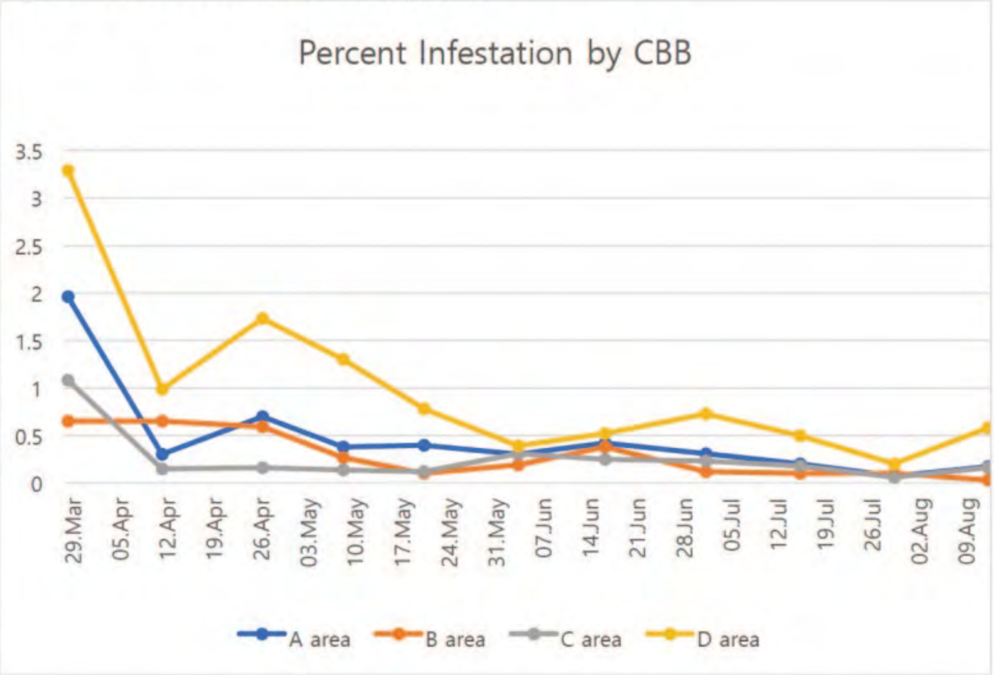
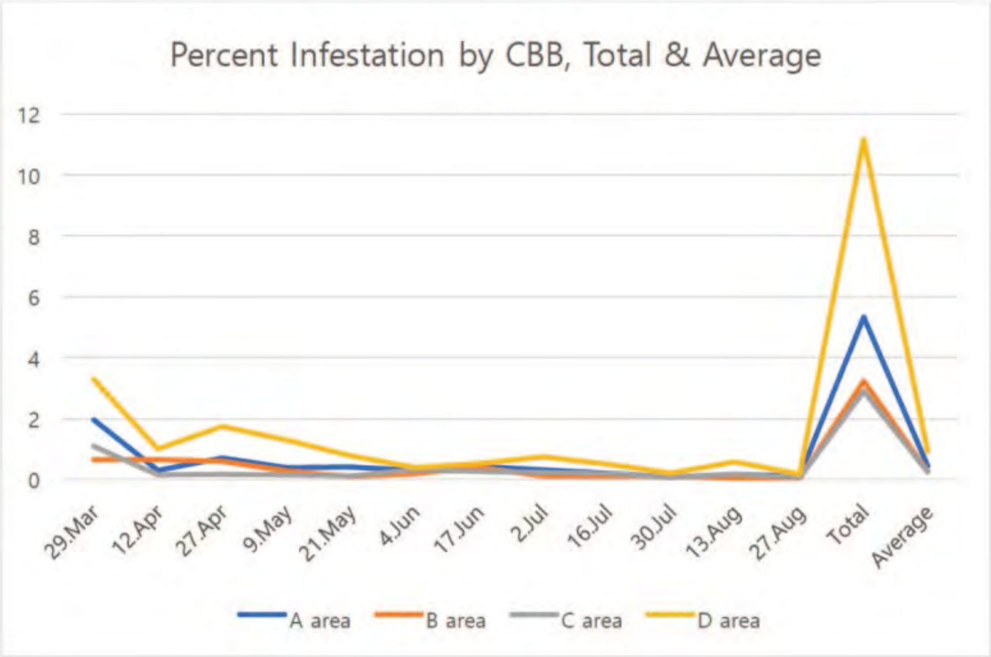


Figure 2.Percent Infestation by CBB, Total & Average



Where to buy ingredient of JADAM pesticides

United States of America
- Duda Diesel : www.dudadiesel.com

Canada
- Duda Diesel : www.dudadiesel.com
- Home Hardware : www.homehardware.ca

EU, England
- Restauro Online : www.restauro-online.com
- Duda Diesel : www.dudadiesel.com
- Chemiphase : www.chemiphase.co.uk

China
- Alibaba : www.alibaba.com

India
- Indiamart : www.indiamart.com

Australia
- Australian Chemical Suppliers : www.australianchemicalsuppliers.com

Russia
- Пульс Цен : https://www.pulscen.ru/

South Africa
- Wantital : www.wantitall.co.za

Vietnam
- Vietchem : www.vietchem.com.vn/
- Dinhduongcaytrong : www.dinhduongcaytrong.net